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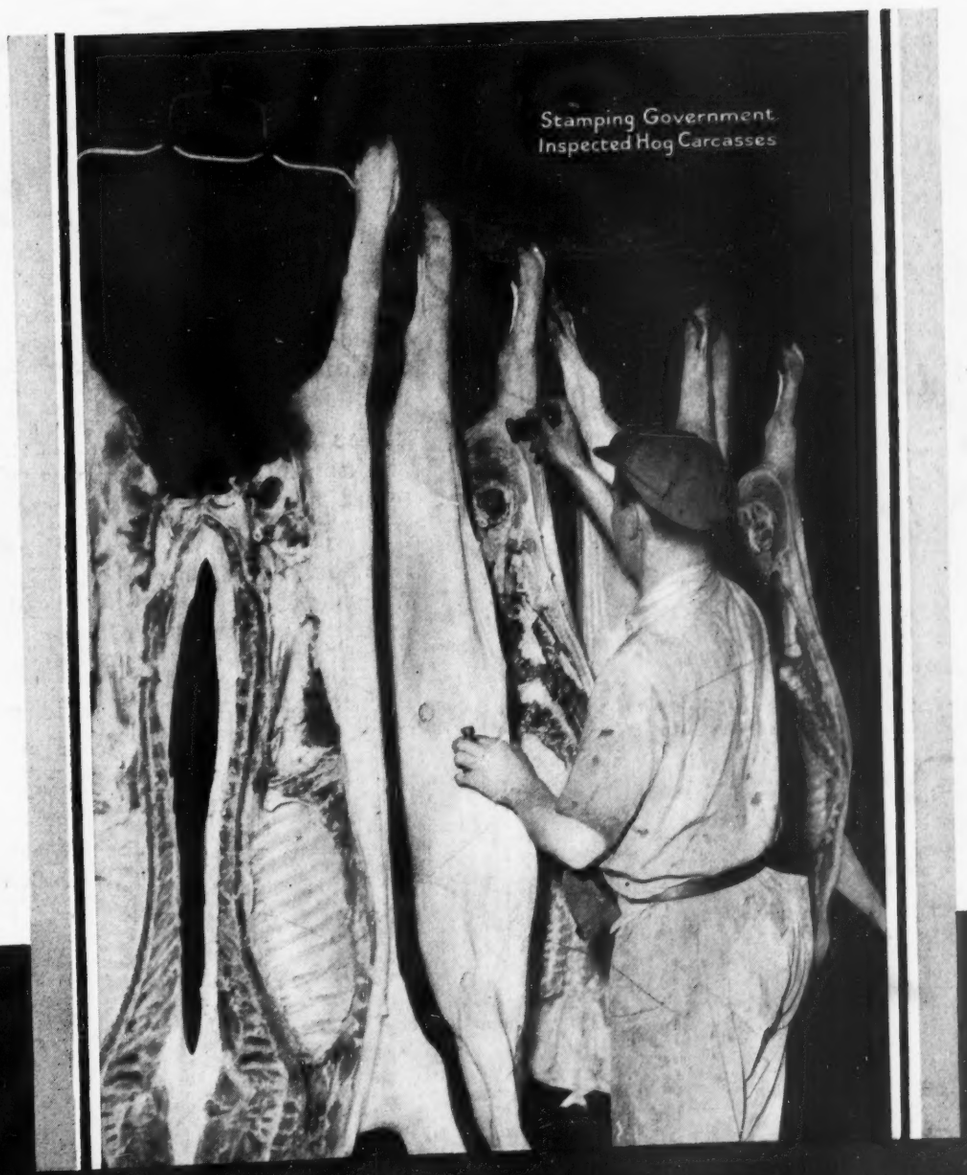


Efficiency Through Merged Operations

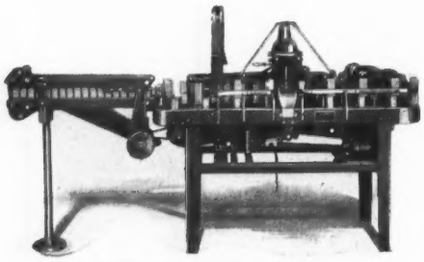
Producing Uniform Grain

Scoring Food

MARCH, 1931

»» Packomatic ENGINEERING DEPARTMENT and DRAFTING ROOM ««

PACKOMATIC ENGINEERING DEPARTMENT



PACKOMATIC CARTON SEALER AND FILLING MACHINE, MODEL 8

A combined top and bottom sealing machine, with volumetric filler.

The filler is easily adjustable and positive, guaranteeing commercially accurate weights with free flowing products.

This machine will turn out 50 perfect packages per minute, with only one operator. Requires floor space of only 9 ft. long x 2 ft. 6 in. wide, weighs only 1065 pounds.

Here ingenious minds develop mechanical equipment which eliminates hand labor and saves millions of dollars each year for hundreds of manufacturers.

These technically efficient, mechanical engineers and draftsmen carefully lay out the specifications for each job, perfectly, accurately.

Each man takes a personal interest in the particular job he is assigned to and follows it through to a completed satisfactory installation.

A Packomatic Engineer is ready to meet you any time, any place, to help you work out your packaging problems.

WRITE — WIRE — OR PHONE
FOR A PACKOMATIC ENGINEER
ANY TIME—ANY PLACE
NO OBLIGATIONS

FERGUSON **NATIONAL**

PACKOMATIC
PACKAGING MACHINERY

J. L. FERGUSON COMPANY, JOLIET, ILLINOIS

Branch Offices: NEW YORK ST. LOUIS LOS ANGELES

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VOLUME 3

FOOD INDUSTRIES

NUMBER 3

The Journal Devoted to the Problems of the Food Manufacturer

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The NATION'S most FAMOUS Cereals too—

EVERY morning when America sits down to breakfast, millions of packages of cereal contribute their contents. Cereal is the universal American breakfast food. Few packaged products equal it in unit volume of sale.

A major packaging job, this—calling not only for speed to keep up with tremendous productions but thoroughness, and cleanliness to protect the product and the manufacturer's reputation. Here again, as in practically every packaging industry, the largest producers of the country's most famous cereals, package their products with Pneumatic Scale packaging machines.

The problem of the best method of packaging in your plant has been solved for you by such concerns as these. The history of the experience of America's largest producers with Pneumatic Scale packaging machinery is contained in an unusual book "An Interview." Ten minutes reading that may save you thousands of dollars in your packaging operations. We shall be glad to send you a copy. Write for it, today.

PNEUMATIC SCALE PACKAGING MACHINERY

PNEUMATIC SCALE CORP., LTD., NORFOLK DOWNS, MASS.

Branch offices in New York, 26 Cortlandt Street; Chicago, 360 North Michigan Avenue; San Francisco, 320 Market Street; Melbourne, Victoria; Sydney, N. S. W., and Trafalgar House, No. 9 Whitehall, London, England

PNEUMATIC MACHINES

Carton Feeders—Bottom Sealers—Lining Machines—Weighing Machines (Net and Gross)—Top Sealers—Wrapping Machines (Tight and Wax)—Capping Machines—Labeling Machines—Vacuum Filling Machines (for liquids or semi-liquids)—Automatic Capping Machines—Automatic Cap Feeding Machines—Tea Ball Machines.

Presenting the story of "selective irradiation" ~a new development in foods

This scientific discovery was made in the Basic Science Research Laboratory of the University of Cincinnati. Its utilization by the public in food and other products will be made possible through an alliance between General Foods Corporation and the University of Cincinnati, to be known as General Development Laboratories, Inc.

Applications of the new discovery indicate far-reaching effects in the food industry. It can be used to add Vitamin D in definitely controllable quantities to many food and pharmaceutical products. It can be used for sterilization in the prevention of food spoilage. Organisms causing fermentation, yeast moulds and similar foes to preservation of foods yield to the new light treatment methods.

The detailed story of "selective irradiation"—its discovery, its application, its possibilities—is told in a booklet just published, "New Discoveries in Light Rays." We believe this booklet will be of interest not only to the food industry, but also to the public generally. It will be sent free upon request.

Write to General Foods *Corporation*

DEPARTMENT 2-M

250 PARK AVENUE NEW YORK CITY

Maxwell House Coffee and Tea, Log Cabin Syrup, Jell-O, Certo, Post's Bran Flakes, Whole Bran, Minute Tapioca, Instant Postum, Hellmann's Mayonnaise Products, Walter Baker's Chocolate and Cocoa, Franklin Baker's Coconut, Calumet Baking Powder, Grape-Nuts, Sanka Coffee, Swans Down Cake Flour, Postum Cereal, Post Toasties, La France, Satina, Diamond Crystal Salt, Jell-O Ice Cream Powder

30% Carved from the Cost of "Chicken Dinners" by Lamson Conveyors

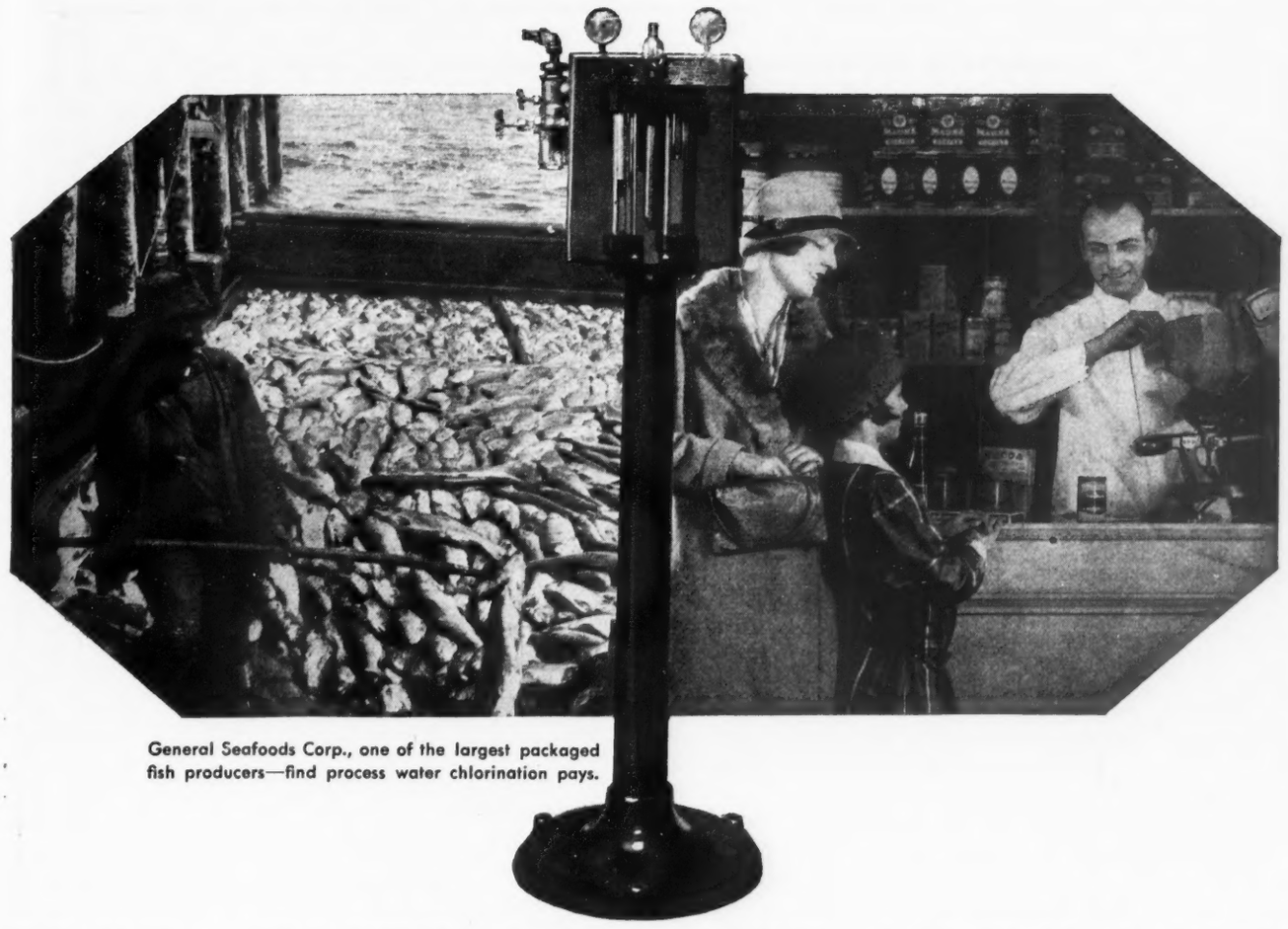
THIS saving, estimated at 30%, includes: Elimination of waste and of damage to boxes, cartons and products; a material saving in freight-elevator power; increased efficiency of labor; reduction of noise and confusion; a favorable revision of compensation insurance rates; a smooth flow of materials through the plant. The Sperry Candy Company of Milwaukee, makers of the famous "Chicken Dinner" candy bars, attributes these economies, and more, to Lamson Conveyors.

Every plant which manufactures or handles products in quantity can be made more efficient, more productive, more profitable, with Lamson Conveyors. Any product, large or small, heavy or light, can be handled economically by a Lamson System.

Lamson engineers, with Lamson's 50 years of experience at their command, are ready to work with your production engineers and executives in planning a conveyor system for your plant. This service is available to you without cost or obligation. Simply write to The Lamson Company, Syracuse, New York.

ABOVE, *Belt conveyors take the filled boxes from the packers to the tying machine. Note the box-cover conveyors in the background.*
AT RIGHT, *Three independent gravity conveyor lines bring empty boxes to the packers.*

LAMSON
CONVEYORS



General Seafoods Corp., one of the largest packaged fish producers—find process water chlorination pays.

THIS QUESTION OF SPOILAGE

If you are keen to eliminate spoilage look to your process water. Is it contaminated?

If it is, it's a sure source of spoilage. But—it can be chlorinated and 50 cents a million gallons is a small premium to pay for absolutely pure process water.

Throughout the world two hundred million lives are safeguarded from water borne disease because of chlorination. Drinking water in over thirty-five hundred American municipalities is daily sterilized with W & T chlorinators.

Why not give your products and your customers this same protection?

We will gladly tell you how.

WALLACE & TIERNAN CO., INC.

Manufacturers of Chlorine Control Apparatus

NEWARK, N. J.

OFFICES IN PRINCIPAL CITIES

A Product of

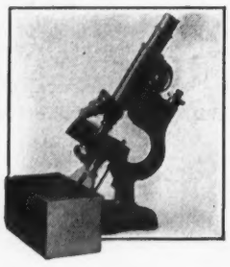
WALLACE & TIERNAN

"The only safe water *is a sterilized water"*

I-2

An advertisement Concerning the Free analysis of folding carton design offered by the Sutherland Paper Company

Sometimes it Pays To be Sceptical



THE strategy of increasing sales of packaged goods in 1931 will be built of sterner stuff than optimism.

All the quality you have built into your product—all the coverage of your dealer distribution—all the desire created by your advertising, finds final and critical test at the point of sale. It is here that your package must challenge attention and choice. Few consumers are able to distinguish any great difference between one brand and another. Your major merchandising objective resolves itself down to packaging your product in a manner that will prompt consumers to choose your goods in preference to competitive brands.

Dare to be sceptical regarding your package design. Dare to consider it from a cold unbiased standpoint.

Is it building or blocking sales? Just what does it have in color, size, typography, art treatment (or a half dozen other important factors) that enables it to do a better selling job than other containers in the same field?

An analysis of your package design will be prepared for you by experienced designers and merchandisers without obligating you in any way. This service is extended for a period of time to all users of printed folding cartons whether customers of the Sutherland Paper Company or not. The survey will include recommendations on any changes that appear advisable. The findings may be accepted or rejected as you see fit. Submit request on your letterhead transmitting samples of your containers to Department of Design, Sutherland Paper Company, Kalamazoo, Michigan.

Sutherland Paper Company

Printed Folding Cartons and Counter Display Containers

Kalamazoo, Michigan

This Specialist in Transporting Meat Is a Judge of Truck Values

"Our International Trucks are very economical in their use of gasoline. We have had excellent service from them and we are glad to recommend them"

Five International Trucks in meat hauling service for the Redman Transfer. The three trucks in the foreground are new Speed Truck models. The Redman fleet consists of 9 Internationals.

DAVE REDMAN holds the above opinion of the 9 Internationals he uses in his transfer business at Ottumwa, Iowa. He is one of the leaders in the middle west in the transportation of meat. Five of his Internationals, with refrigerator bodies, are in this service, hauling fresh meat every day in a radius of over 150 miles. They operate in Iowa, Illinois, Missouri, Minnesota, Nebraska, and Indiana.

Mr. Redman's meat shipping business comes from packing houses at Ottumwa, Omaha, Des Moines, and St. Joseph, Mo. Loaded cars are sent to Ottumwa to be split four ways. The meat is then delivered to dealers in the area covered.

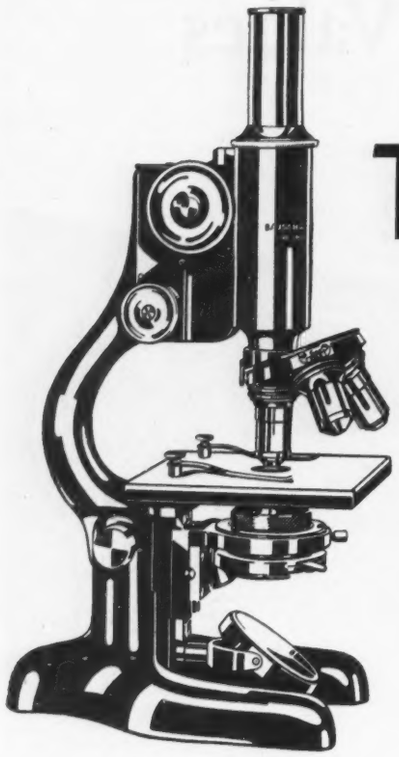
"In order to get and hold a meat delivery business, you must get there on time," Mr. Redman says. "And to get the most use of the trucks, you must work them to the limit of their endurance and capacity. Our drivers get in at night just in time for the mechanics in the garage to make a complete inspection of the units and to give them the proper lubrication. Then the meat is loaded through the night, and early the next morning the drivers are on their way again."

Mr. Redman's experience with International trucks is similar to that of others in the meat industry who have come to rely on these trucks for dependable transportation. You can see the complete line at the nearest of 183 Company-owned branches in the United States and Canada. There are sizes from ¾-ton up to 5-ton, and bodies to suit your needs. Write for information.

INTERNATIONAL HARVESTER COMPANY
OF AMERICA
(Incorporated)
606 So. Michigan Ave. Chicago, Illinois

INTERNATIONAL

INTERNATIONAL TRUCKS



B & L Microscope FFS

These Instruments Make Profits— Stop Losses

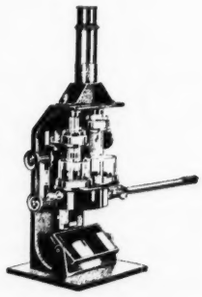
NOT by themselves, of course. But in the hands of trained laboratory men Bausch & Lomb Optical Instruments detect poor raw materials, show up flaws in finished products before the entire lot is spoiled, control your production processes, maintain uniform quality. In fact your production can become a matter of precision and certainty if you adopt the optical control methods that belong to this forward looking industrial era.

The instruments shown here are some of those particularly useful in the food industries. Microscope FFS has a range of magnification from 20X to approximately 1000X. This instrument is used extensively for laboratory control in the food industries.

We have information telling you how these instruments can be used to your advantage. Send for it today.

ABBE REFRACTOMETER

The Abbe Refractometer is used to determine the strength and purity of solutions, analysis of fats, determination of total solids, etc.



H-ION COLORIMETER

This colorimeter is used to determine pH with accuracy, speed and precision.

BAUSCH & LOMB OPTICAL COMPANY

603 St. Paul Street « » Rochester, N. Y.

TO GREATER VISION THROUGH OPTICAL SCIENCE

BAUSCH & LOMB

BAUSCH & LOMB

MAKERS OF ORTHOGON EYEGLASS LENSES FOR BETTER VISION

They shall not pass . . . UNNOTICED

"They Shall Not Pass Unnoticed" is the battle cry of truck fleet owners who are winning consumer dollars. Your trucks carry your munitions to the buying front. They continually pass the reviewing stands of the great American people. Every day is inspection day. Every trip is dress parade. Meyercord Weather-Tested truck transfers furnish attractive uniforms and decorations which make trucks command instant and favorable attention. These transfer truck advertisements duplicate the work of the country's leading artists with such fidelity and accuracy that even an expert cannot tell them from hand work. Yet, they are inexpensive, easy to apply and as permanent as the surface itself.

They are unlimited in size, color or design. The Mickelberry fleet is one of hundreds which finds Meyercord truck transfers practicable and profitable.

A talented staff of competent delivery equipment designers and artists will be glad to submit suggestions without cost to you. Inquire.

MEYERCORD WEATHER TESTED TRANSFERS

More Enduring Than the Surface

TRANSPORTATION DIVISION—THE MEYERCORD CO., 120 S. LA SALLE ST., CHICAGO

"Where a GOOD SUGGESTION meets an open mind"

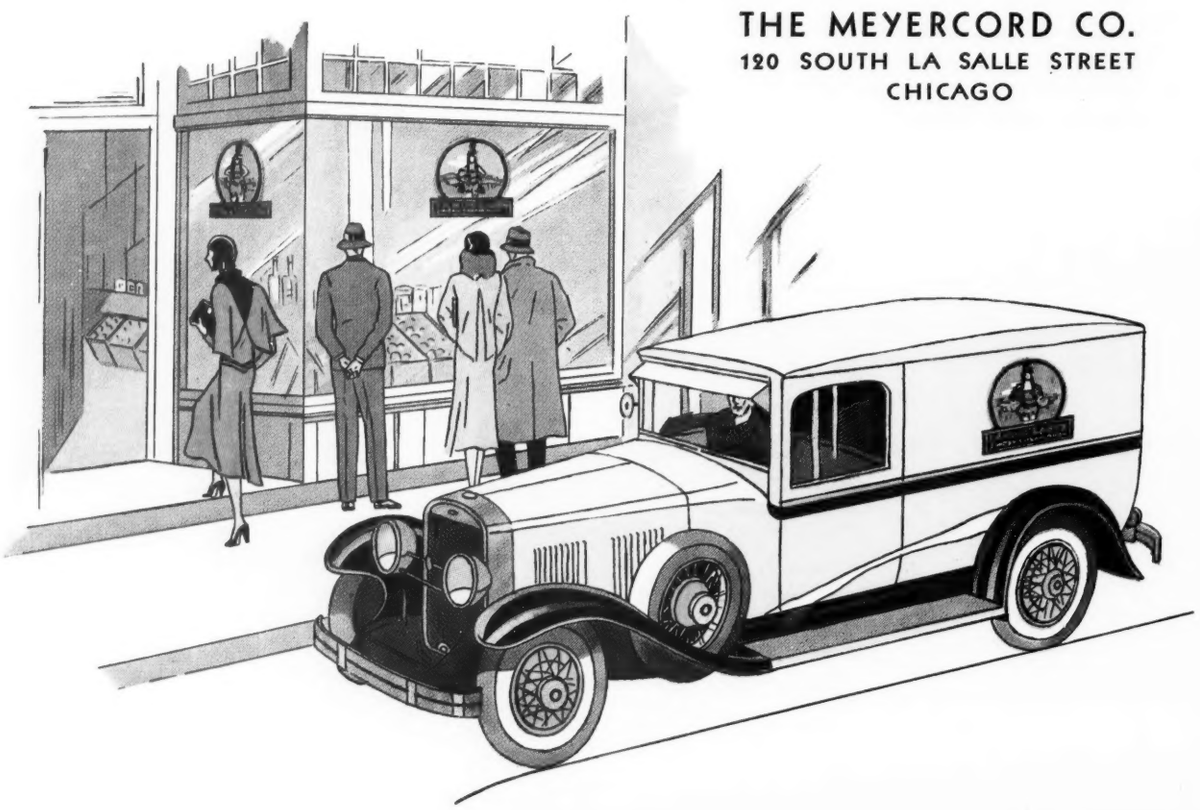
Inside the modern store buying interest is scattered. Hundreds of attractively labeled articles are competing for attention. And in the struggle for a commanding position your product may be overlooked. But at the window where shoppers pause for buying suggestions your product can dominate the attention. Here you can show it in its most tempting aspects and forcibly present your sales story.

Meyercord "All-Purpose" Du-Cal signs when placed in windows and doors do this very thing.

Attractive in design, sparkling with color, they command the attention and, more important, by a concise, direct-to-the-point story, make sales. Day and night your message is there with its potent suggestion to buy.

Furthermore these same durable Weather-Tested signs can be used on trucks, counters and showcases to give you a complete inside and on-the-street tie-up. Ask for the booklet, "Dealer Identification With Decalcomania."

THE MEYERCORD CO.
120 SOUTH LA SALLE STREET
CHICAGO



MADE OF STEEL

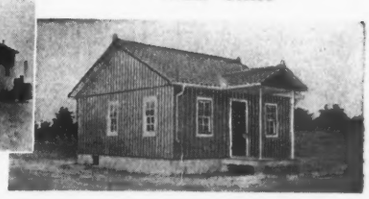
BUTLER

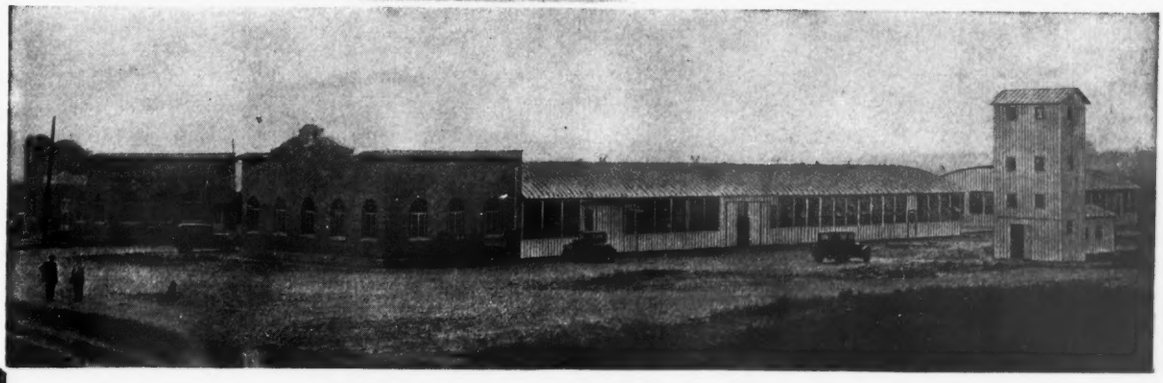
READY-MADE STEEL BUILDINGS

Duplex Bungalow

Cottage

Field Office





Above—Factory

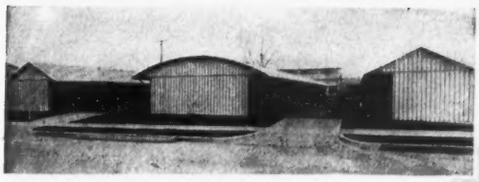
SAVE

For All Branches of Industry

THERE is a distinct saving in their first cost as compared to any other non-combustible construction. Complete materials in ready-made, standardized structural units make possible quick and economical installation. Made entirely of steel, of steel and stucco or of steel and masonry—further savings are assured through low maintenance and small depreciation charges.

In one industry Butler Ready-Made Steel Buildings contributed to a two-thirds reduction in fire insurance rates. Enlargement at any time is only a matter of joining on standardized units of the necessary dimensions. The same features that contribute to quick and simple erection facilitate taking down and re-erection with no more loss than a few dropped bolts. Insulation with commercial wall board or plaster secures the comfort necessary where skilled workers are involved. The structural strength of steel, multiplied by Butler methods of shaping, gives to Ready-Made Steel Buildings characteristics of permanence which save you all thoughts of rebuilding for many years to come.

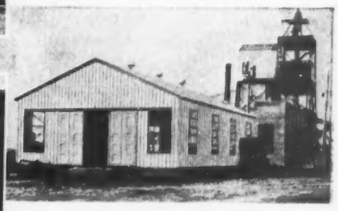
A new book picturing installations of many types of Butler Ready-Made Steel Buildings awaits the request of interested officials.



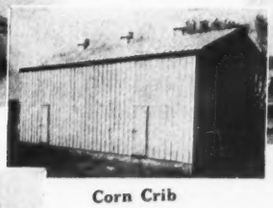
Below—Gasoline Refinery

At Left—Parking Station

At Right—Railway Scale House



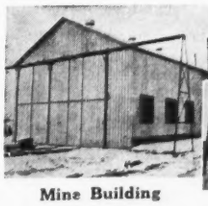
Above—Mine Building



Freight Depot

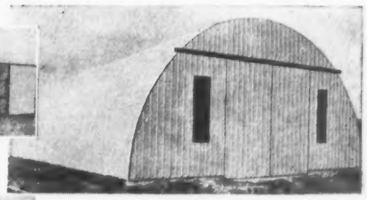
Corn Crib

Airplane Hangar



Mine Building

Airplane Hangar



Above—Farm Machinery Shelter

Below—Bus and Truck Garage

Above—Oil Well Service Plant

At Left—Processing Plant

BUTLER MANUFACTURING COMPANY

1249 EASTERN AVE., KANSAS CITY, MO.

949 SIXTH AVE. S. E., MINNEAPOLIS, MINN.

Good IDEAS CONTRIBUTE TO INDUSTRIAL PROGRESS

here is one

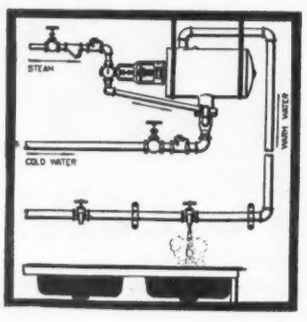
For Plants Using Hot or Warm Water of Various Temperatures at Widely Distributed Points

● In many modern industrial plants this Sylphon product has established its worth. It does just one thing and does it everlastingly right. It is easily adjusted to mix steam with water to heat the water to the degree of temperature desired at the exact point of usage.

● It does not supplant storage-tank heaters or large instantaneous heaters, but supplements them. It injects steam directly into cold water or water from a storage tank heater and changes it from a lower to a higher unvarying temperature for a particular location and purpose. The temperature of the water supply to other fixtures is not affected. No loss from condensation, no traps required, and the water is heated only as used, thus saving steam. Its economic possibilities are sufficient to justify a complete reorganization of most any hot water supply system.

A Wide Range of Possibilities

● The Sylphon Steam-Water Mixer has a wide range of adaptability for supplying uniformly tempered water for processes of all characters, washstands and showers—for wash wheels in laundries and tanneries, wash water in textile mills, chemical plants, dairies, bakeries, confectionery plants, and restaurants. This instrument is fully described, as to construction, operation, installation and capacities in our free literature. Send for Bulletin **EG-125.**



● This illustration shows a Sylphon Steam-Water Mixer supplying warm water to wash basins in an industrial plant.

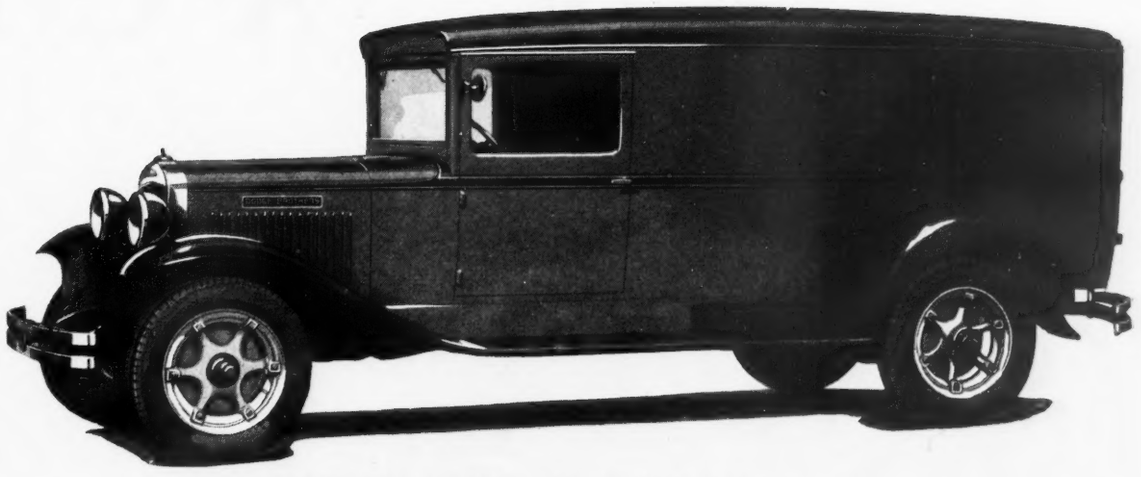
Easy to Install

● The Sylphon Steam-Water Mixer consists of three principal parts, Sylphon Temperature Regulator, Mixing Nozzle and Equalizing Tank. The Automatic regulator has as its motor element the all-metal Sylphon Bellows.

FULTON SYLPHON CO.
KNOXVILLE, TENN., U.S.A.

European Representatives, Crosby Valve and Eng. Co., Ltd., 41-2 Foley St., London, W. I., Eng.; Canadian Representatives, Darling Bros., Ltd., 140 Prince St., Montreal, Que., Can.

REPRESENTATIVES IN ALL PRINCIPAL CITES IN U. S. A.



1½-Ton Chassis with Panel Body—$875, F. O. B. Detroit

LOW COST
FOR EVERY DELIVERY MADE

48-horsepower truck engine with full-pressure lubrication and 43¾-pound crankshaft . . . pump cooling with thermostatic control . . . rugged single-plate clutch . . . 15-gallon gasoline tank . . . heavy-duty 4-speed transmission . . . massive full-floating rear axle . . . 7-inch frame with five rigid cross-members . . . sturdy semi-elliptic truck springs in sizes to fit your needs . . . internal hydraulic 4-wheel brakes.

Such features as these assure to those engaged in the food industries who own 1 to 1½-ton Dodge Trucks the kind of performance, dependability, long life and economy that result in low cost for every delivery made.

Your Dodge Brothers Dealer has the facts. Ask him to arrange a test—with you behind the wheel.

THE COMPLETE LINE OF DODGE TRUCKS RANGES IN PAYLOAD CAPACITIES FROM 1,200 TO 11,175 POUNDS—PRICED, CHASSIS F. O. B. DETROIT, FROM $435 TO $2695, INCLUDING THE 1½-TON CHASSIS AT . . . .

$595

DUAL REAR WHEELS AT SLIGHT EXTRA COST

DEPENDABLE
DODGE TRUCKS

AN ACH

Type K totally enclosed, fan-cooled induction motor

GENERAL ELECTRIC Type K totally enclosed, fan-cooled induction motors are the culmination of ten years' experience in the design, manufacture, and application of such motors. They are strong and rigid, yet deliver a greater output per pound of material than is possible with ordinary methods of total enclosure.

G-E Type K totally enclosed, fan-cooled motors are particularly suited for application in dirty and dusty atmospheres or in locations where motors are exposed to acids or alkalis. The standard fan-cooled motors are "approved" for applications involving hazardous dust conditions (Class II, Group G) and, with suitable modifications, for applications involving hazardous gas conditions (Class I, Group D).

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GENERAL

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y.

IEVEMENT

IN PROTECTION *and* PERFORMANCE

Features of Type K Totally Enclosed, Fan-cooled Motors

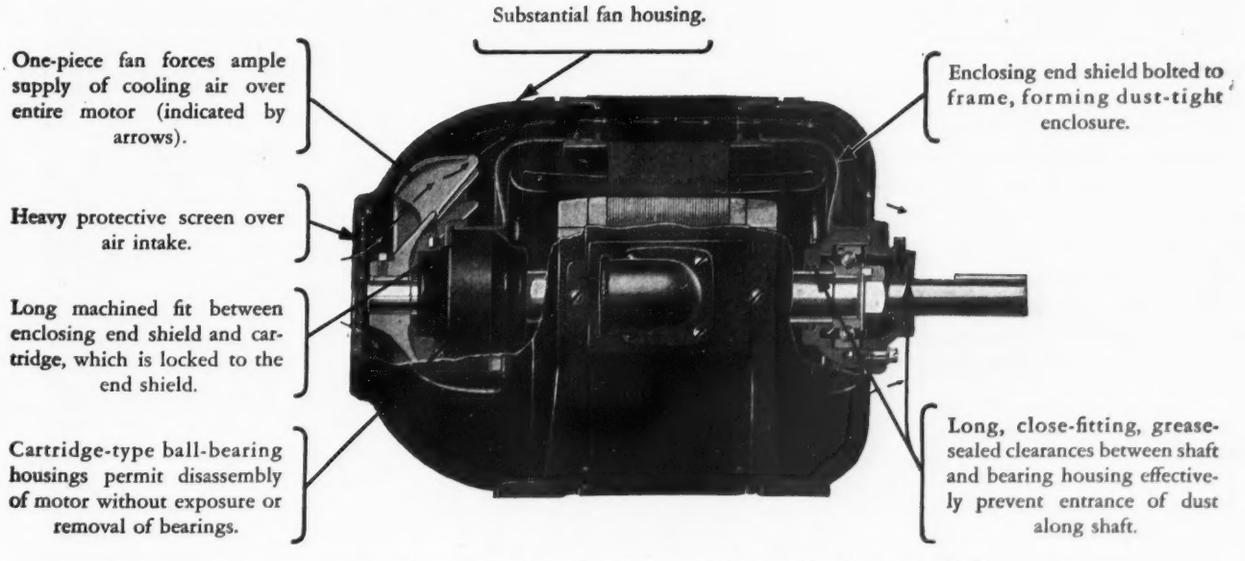
Simple, dust-tight, weatherproof construction—easily assembled and disassembled.

Cartridge-type bearing housings—dust-tight, grease-packed—bearings protected even when rotor is removed.

Double-voltage connection feature for 220- and 440-volt motors.

Braced windings for full-voltage starting.

Open-motor mounting dimensions in all except largest sizes.


Substantial fan housing.
One-piece fan forces ample supply of cooling air over entire motor (indicated by arrows).
Heavy protective screen over air intake.
Long machined fit between enclosing end shield and cartridge, which is locked to the end shield.
Cartridge-type ball-bearing housings permit disassembly of motor without exposure or removal of bearings.
Enclosing end shield bolted to frame, forming dust-tight enclosure.
Long, close-fitting, grease-sealed clearances between shaft and bearing housing effectively prevent entrance of dust along shaft.

Sectional view of Type K totally enclosed, fan-cooled motor showing method of ventilation and large, unobstructed air passages

201-204

ELECTRIC

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Each machine will wrap 35,000 cigars per day. By designing the machine so that it can be operated in conjunction with the banding machine, no increase in labor is necessary—the girl who formerly took care of the banding machine, now supervises *both* machines.

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PACKAGE MACHINERY COMPANY
Springfield, Massachusetts
New York Chicago Los Angeles
London: Baker Perkins, Ltd.

Battery of our wrapping machines in the Congress Cigar Company plant, Philadelphia

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Over 150 Million Packages per day are wrapped on our Machines

what DURIRON and DURIMET mean to food processing

• Finding a way to eliminate contamination of food products and corrosion of equipment is a question with which food manufacturers are rightly concerned. The constant attacks of fruit juices and other food acids on equipment result in a depreciation expense, which it is only good business to bring down to the lowest possible figure.

For nearly twenty years the engineers of The Duriron Company have been engaged in combating the destructive effects of corrosion. Their achievements have brought to scores of industries new economies in time, labor and plant upkeep.

Many food manufacturers have availed themselves of Duriron acid-proof devices. Now comes Durimet, our nickel-chrome-silicon alloy steel, to supplement Duriron in the processing of foods of practically every description.

Durimet was developed by our engineers as a remarkably practical answer for corrosive conditions. Stronger than mild steel, and much longer lived, Durimet can be machined, drilled and threaded without in the least impairing its much desired qualities. It is produced in sheets, plates, bars and castings, and fabricated in scores of forms.

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Valves
Pumps
Pipe and fittings
Agitators
and other such equipment

Duriron, Durimet and Durco Nirosta alloys are ideal for eliminating contamination and resisting corrosion, thus insuring purity in food processing.

SEE OUR EXHIBIT
CHEMICAL SHOW
MAY 4 TO 9
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MORE and more manufacturers are learning what a change in the package can mean to the sales of their products. Good packaging —modern packaging—occupies a more prominent role than ever before in successful merchandising. And expertly designed Canco packages capture the fancy and sales of the market your product appeals to. Low, medium or luxury income markets—at Canco there are specialists to consult with on the package that will strengthen sales in any or all of the three—a package that will fit your market and thus contribute materially to sales.

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FOOD INDUSTRIES

The Journal Devoted to the Problems of the Food Manufacturer

Volume 3.....A McGraw-Hill Publication—Established 1928.....Number 3

NEW YORK, MARCH, 1931

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Laurence V. Burton, Editor

A Platform for Stabilizing American Business

THE PRESENT CYCLE of business depression appears to be somewhere near its end. Less fear and more optimism are becoming more apparent everywhere. But although business is improving very slowly, and probably will continue an irregular upward course until it gets distinctly above normal, a few years hence, it will then turn down again. And then we will have another depression. The causes of cycles are found in the minds of men—nowhere else. And only through their minds can the cycles be made less violent. We say "less violent" because until human nature is radically changed, cycles cannot be obliterated.

AFTER A SEARCHING EXAMINATION of the possible course of action that men—not governments—may follow to stabilize business, made by the personnel of the McGraw-Hill Publishing Company, a plan has been evolved which appears as a supplement to this issue of *Food Industries*. This plan necessarily is general in its nature, for it is devised to fit all business and has for its purpose an elucidation of a method of getting business back to normal and, furthermore, of keeping it comfortably close to normal.

IT NEEDS CAREFUL STUDY and a distinct effort to apply its principles. *Food Industries* will discuss pertinent features of it each month, for the restoration of business normalcy is a very necessary development at this moment.

THE PROPOSED PLAN is more than a means of increasing business activity: it is a plan of stabilization. As Paul Warburg has recently so aptly said, "The curve of business cycles can be flattened better by sitting on the bulges than by attempting to push up the valleys."

But who will be the unpopular prophet who will say to business men in times of great prosperity, "You are selling too much; you are producing too much; you are making too much money." Nobody!

THE COMPOSITE or mob memory of men is short, if indeed it exists at all. As business men, we plan yearly quotas above the preceding years on the premise that sales simply must keep on going up, and up, and up. And then we hit a year like 1920, 1924, 1926, or 1930, after which our yearly increasing quotas are begun from lower levels until the next minor or major business cycle upsets unjustified optimism.

FAR BETTER would it be to abandon the system of year-to-year planning and adopt a three-year, or longer, period as a basis for scheduling future business activities. This means that predicted budgets and quotas should be based on the average of performance of the past three or four years and not on the year just closed, whether the planning shall be done in 1931 or in any succeeding year. This will tend to eliminate too rapid changes in production, sales quotas, or expansion of facilities.

TO ILLUSTRATE by simile, we should like to point out that small ships pitch terrifically in a heavy sea, in which the long liners plow steadily forward. If all business will adopt the longer period for the basis of operations, its course will be much smoother. Accounting functions can still continue on the yearly basis without being impaired by the long-range planning, or without vitiating its effects. By using the long-range method of planning, every business will automatically avoid much of the bad effects of unwarranted expansion.

Technical Help for the Summer Rush

NOW is the time for the seasonal food manufacturer to lay plans for his summer research work, particularly for those who do not feel they can afford full-time research departments. Problems of processing and preserving, new methods, new equipment, flavor and quality problems can be solved only by carefully planned experiment at the busiest time of the year, when every member of the staff is working under high pressure. And when considerable extra time is required to supervise and direct the untrained temporary workers who are necessary, it is quite probable that many problems perforce thus remain unsolved from year to year.

One way out is to engage the services of a consulting chemist or engineer for a specific date next summer. When the problems involved are more important than usual and require experienced and independent minds for their solution this is the surest and quickest way.

Another way is the vacation employment of the more mature students and graduates of food bacteriology and food chemistry. Although most of them have had no industrial experience they are thoroughly trained in fundamentals and offer the manufacturer an opportunity to employ highly intelligent and technically trained minds on a reasonable temporary basis. Often through this means an employer can have the opportunity of studying prospective technical employees at close range, and test out his future help without incurring an obligation to continue employment beyond a couple of months.

To manufacturers interested in securing summer employees for special work FOOD INDUSTRIES offers its services. It is well to remember, however, that provision for this kind of work must be made in the next 90 days, because most colleges and universities close early in June.

Clean Up and Stay Clean

DIRT and disorder are enemies of profit. Go through your plant and look for the inevitable junk that accumulates in all out-of-the-way places. The loose bolts on the window sill, the handful of waste on a nail, the dirty oil can in a corner, the odd board for which there is no use, the miscellaneous pipe fittings dangling on a wire, cupboards loaded with odds and ends that belong in tool and supply rooms—all these and hundreds of other items are waste, disorder, and lost profits.

If your plant is experiencing slim going these days, you will have plenty of time to look the place over with a critical eye. Then get busy on your own desk and have a house-cleaning. After your own office is in perfect order and all the useless odds and ends are removed and the place is absolutely clean, then get the gang, start at one end, and clean up! Any plant should always be clean, but if you are hard put to make work here is the best way to do it.

All the junk that some day in the remote future might be useful should be classified and disposed. Odds and ends of usable supplies should go back to the storeroom, tools to the tool room, and the dirt and useless stuff sent to the ash pile. If you love to hang onto old things for no particular reason, pretend that you are going to move the plant and ask yourself if you would pay real money to have them moved—even a mile. If you wouldn't, then get rid of them.

When that job is done then have the windows washed and walls repainted. Replace those worn tiles in the floor. And don't forget the roof and the yard.

While you are doing all these jobs you will find plenty of repair jobs that need attention, to say nothing of some old machines that ought to be thrown out and replaced by new ones. But don't sell them. Wreck them! And resolve that no matter what happens, henceforth the plant shall be kept clean and in perfect order.

This will require personnel training, and now is the time to lay plans for that. Dirt and disorder never live in the same plant with profits.

A Trend to Be Corrected

A NEW problem is facing trade associations, the existence of which we believe is at present unsuspected or undefined. If we had not encountered identical conditions in four different conventions in the past year, we should be inclined to feel that it was a purely local situation.

The symptoms are complaints from exhibitors of machinery and supplies to the effect that production men are not coming to inspect the displays as they formerly did. Many exhibitors have informed representatives of FOOD INDUSTRIES that the number of plant superintendents calling at their headquarters is so small that future exhibits are hardly justifiable if the conditions continue.

In studying the conditions surrounding each of these conventions, we have observed that changes in the type of subjects on programs in conformity with the changing times have brought about corresponding changes in the character of the interests of those in attendance. Also, there is a growing tendency to separate the programs into sales and distribution types as well as production types. Admittedly this is a justifiable separation, but when the program that is of special interest to the production man is held at the only time in which the machinery exhibit is open for inspection, the attendance at either the meeting or the exhibition is divided.

Sad experience has taught several associations in the past that the real pulling power of a convention is not the program but the machinery exhibit. The biggest convention flop in industrial history occurred when it was decided to do away with equipment exhibits at the annual convention. Also, the absence of gray heads for two years in succession at the informal technical sessions of one association is a fact of tremendous significance that the older directors of an association must not overlook. These younger men who are seeking knowledge are the men who either today or tomorrow will be buying equipment. Therefore, it is unwise to put their particular interests in conflict with open hours of exhibits, for eventually there will be fewer exhibitors and, in turn, smaller attendance.

Frankly, we recommend to association directors to consider these things and, while revising their programs to conform to the new trends, to avoid conflict of technical sessions and technical exhibits. The younger production men are much more serious minded than the salesmen of their own industry and it has been our observation that those who feel like singing "Sweet Adeline" are not often factory superintendents. The factory superintendent may occasionally feel the urge to raise his voice in song, but as a rule he is up early in the morning at his convention and ready for action before his sales brethren are awake. Therefore, it appears that here is the opportunity to re-arrange convention programs to the advantage of everyone.

Votes *versus* Quality

IT IS most regrettable that this business depression has had to occur at a period preceding elections when Congress can take advantage of the situation and turn it to political capital. Investigations into the price of bread and milk cannot be construed in any way but as demagogic bids for votes. It is a pity that Congress holds many men whose business services have an economic value that is so low that their legislative jobs are vitally important to them. One can hardly imagine an Alexander Legge, with a $100,000 job awaiting him at home, wasting legislative time to curry votes that would keep him working on a senatorial salary.

Bread is a scientifically prepared product today when it is in the quality class. Each year sees the better quality breads brought closer to a complete food by the aid of research. Scientific research as well as the newer raw materials of bread manufacture cost money. If the senators in Washington are so zealous for the purses of the consumers let them also be equally solicitous for their health. An inquisition that forces prices down must inevitably be reflected in decreased costs and lowered quality. It will tend to undo the progress of years of effort to improve the quality of bread and yet keep costs within reason.

Furthermore, a senator from a wheat-producing state should realize that a wise and sincere attitude, to be helpful to his farmer constituents, should be in support of better bread. In the longer view, cheaper quality can result only in diminished consumption of wheat, and the self-appointed friends of the farmer will be to blame.

On the side of milk it should be pointed out that every dairy is compelled by municipal ordinance to obtain its milk under controlled condition and to have expensive and complex equipment, all of which contribute to the quality of the milk but also add considerably to its cost of production and distribution. Whenever the dairy industry is faced with the necessity of increasing its prices the result is almost always an investigation by sundry civic bodies. Increasing the price of milk one cent a quart costs a tremendous effort—in fact, so great an effort that not many dairymen willingly consider temporary reductions of price, for after a short period when the temporary condition passes, price can be restored only after another disagreeable series of investigations. Hence it is easier to let it stay up than go through the old fight once more, and in the long run producers and dairymen stand to lose more than the public through reduced volume.

So much for the vote-getting investigations.

Examine Your Markets

UNFORTUNATELY many a manufacturer has not the slightest idea of what market research is. As a startling example of this point FOOD INDUSTRIES recently was asked to advise a manufacturer what uses could be found for a newly designed machine he had started to make. After five people in this organization spent many hours in studying it, not a single use could be pointed out that could not be done better or cheaper by something else. Here was a machine for which drawings, patterns, castings, forgings, machine work had been made, and even advertising matter printed, apparently before it occurred to anybody to find out what the market for that item could possibly be. The management should never have let this job get off the drafting boards and into the shop before the necessary research had been conducted into its economic soundness.

Food manufacturers should take counsel and examine their own activities. Most men never take economics seriously until times of stress, but, as Charles Kettering so aptly states: "There is nothing like putting a man before the poor-house door to make him think constructively."

To work hard, to manufacture goods, or to try to sell them is useless when the market is not there. If manufacturers of equipment, as well as food manufacturers, will study the economics of their primary markets, and their secondary or indirect markets—in other words, study distribution — much of the overproduction that has caused the cut-throat competition of 1930 will be avoided.

Hocus Pocus—Non Compos Mentis

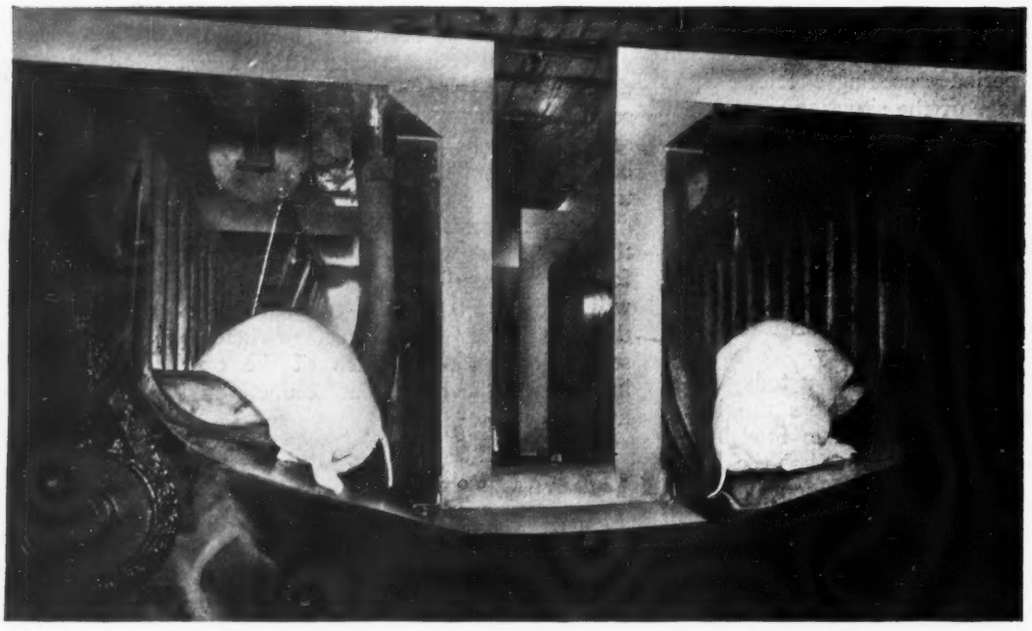
FROM sunny California, where a state senator has proposed to outlaw the sale or possession of bananas (*Musa sapientum*) to stimulate the use of native fruits, to rock-ribbed New England, where a Vermont legislator with high regard for chromatic consistency would require all margarine sold in the Green Mountain state to be colored green, efforts to solve economic ills by governmental legerdemain continue. Perhaps it is natural, therefore, that Washington should be the center of such legislative frenzy.

After twenty years of deliberation, the House of Representatives of these United States has passed the Capper-Kelly price maintenance bill. It permits manufacturers to set the prices on their trademarked goods. That is, it does so when the products are not necessities, when the profit margin is not over 20 per cent, when the retailer is not overstocked, when he doesn't care to return the products for rebate; and a whole list of other exceptions that make the bill so useless that even the Senate members, though hardly noted for avoiding useless discussion, sadly returned it to a Congressional cubbyhole.

But the reputation of the Senate was not to fall so easily. Because the Federal Farm Board had spent millions without being able to maintain the price of wheat, it was clear to the senators that bakers must be making millions by maintaining the price of bread. Milk and sugar, it was felt, required similar scrutiny, such was the ease of artificial price maintenance as revealed by Farm Board operations.

The committee appointed to this task was not particularly interested in the fact that the cost of labor, of distribution, and of ingredients other than wheat make up the major cost of bread. It avidly seized upon the fact that bread was being sold in some places for five cents, but that in Washington it sold for nine. If drought-stricken farmers were to be relieved, why not gout-stricken legislators?

Now the committee is all smiles. Now senators can buy bread in Washington for five cents per pound loaf. Perhaps a similar investigation would show senators where $17.50 suits can be bought. After all, such sterling examples of senatorial economy may pave the way for lower taxes. And certainly a nationally known chain store, ever alert to adjust its products to the price class of its customers, can feel repaid as it quotes the *Congressional Record* for its advertising.



Hog carcasses emerging from a two-line dehairer. It can handle 550 hogs an hour

Production Efficiency Raised by

OPERATING UNITY

How Two Separate Meat Plants Were Made to Operate as One

By F. HOWARD FIROR
Production Manager
Adolf Gobel, Inc.,
New York City

A MERGER, in the common use of the term, may mean little more than alteration of a few legal phrases and a shift of figures from one paper to another. The changes just completed by Adolf Gobel, Inc., in two New York plants are not the kind headlined in the financial press. Yet they represent a tangible, physical linking of the operations of the two plants that fit the literal meaning of the term "merger" far more closely than the first.

For the past few years, Adolf Gobel, Inc., has operated two divisions in Greater New York: the Manhattan division, with a plant at 11th Ave. and 40th St., and the Brooklyn division, with a plant at Morgan Ave. and Rock St. The two divisions operated as separate entities. Although slaughtering was concentrated at the Manhattan plant, each division cut, cured, and smoked pork, and prepared sliced bacon, sausages, and other meat specialties. Independent accounting systems, inventories, and sub-executive management were maintained. There was no clear-cut co-ordination of sales and product distribution from the two divisions, each plant being used as the source for separate distribution areas.

The duplications which necessarily resulted from the similarity of many operations in the two plants were hardly objectionable in former times, when necessity for manual operations limited gains from concentrated, large-scale production, and when economical ranges for truck distribution were small.

Developments of mechanized methods of cutting and processing, however, as well as the use of refrigerated trucks capable of covering wider delivery areas, led to the realization that a real "merger" of the plants was advisable for further production and distribution efficiency.

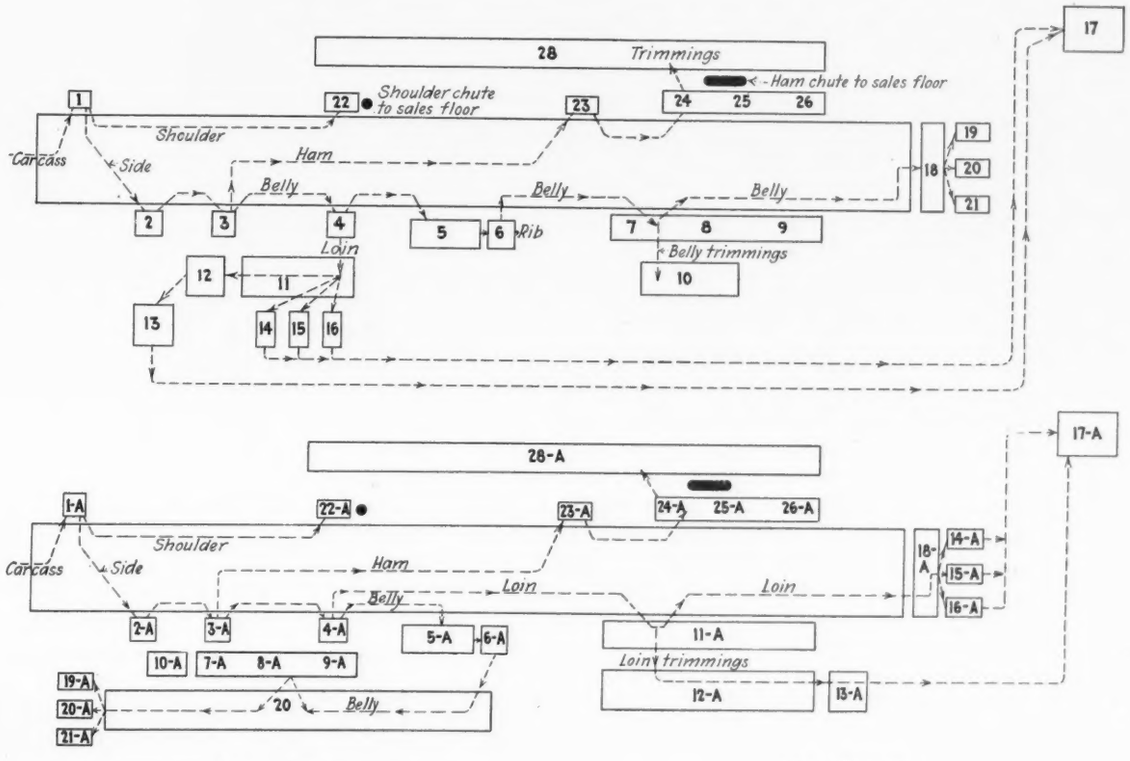
By concentrating all the slaughtering, cutting, curing, smoking, and bacon slicing in the Manhattan plant and the sausage manufacture, boiling, cooking, baking, and other specialty manufacture in the Brooklyn plant, the two become part of a single operating division. Orders and sales records have been unified by the aid of telephone-typewriter equipment between the two plants.

Personnel has been shifted to bring all those engaged in the same work into the same plant under the same department head. Only the 7 miles that separate the two plants differentiates them from an individual unit, and a co-ordinated system of truck operation largely lessens the effect of this factor.

The mechanical changes necessary to bring about this concentration were not so drastic as might be supposed. Modernization of several operations was advisable at the time even if the shift to plant specialization had not been contemplated, and as far as the mechanical side is concerned, efficient modernization necessarily involves a shift to higher or more concentrated production levels.

A two-line Boss dehairer was installed in the Manhattan plant last autumn, permitting the capacity of the slaughtering and dressing operations to go as high as

How Product Flow on Cutting Table Was Rearranged

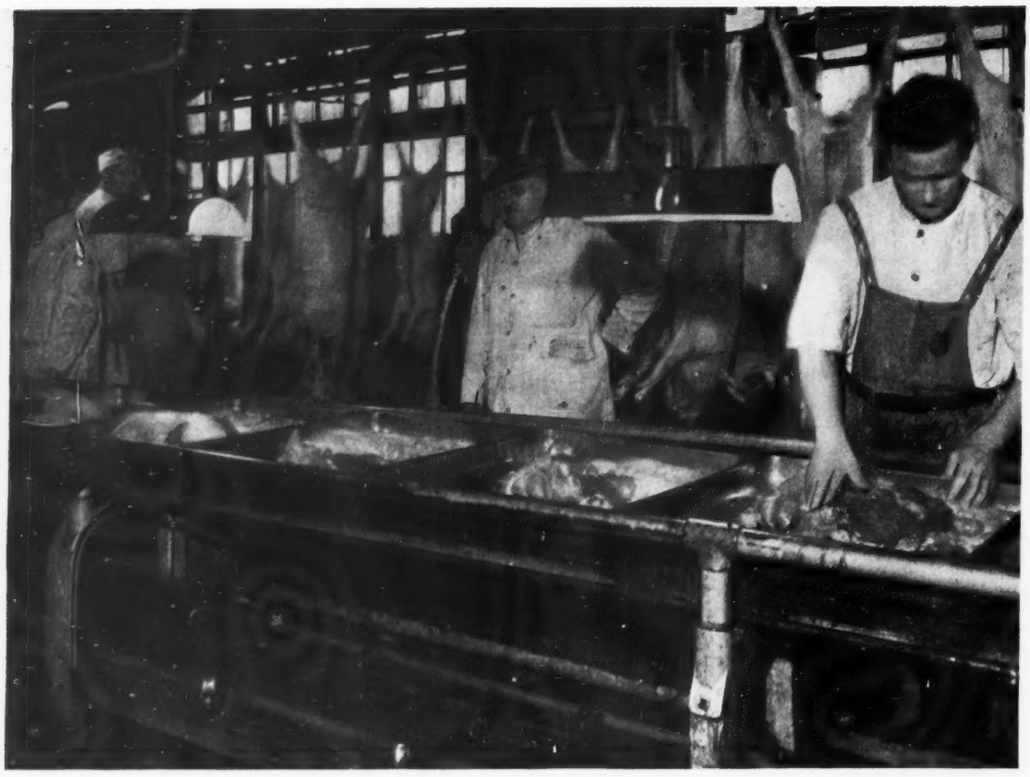


Old System

1. Shoulder is cut from carcass with compressed air knife.
2. Electric saw cuts "aitch" bone, preparatory to removing ham from whole side.
3. Ham is removed from side with knife.
4. Side is split into loin and belly with 24-lb. cleaver.
5. Belly roller flattens side in preparation for removal of rib.
6. Rib is removed.
7, 8, 9. Positions for trimming of bellies.
10. Bench on which belly trimmings are skinned and sorted.
11. Bench on which fatback is removed from loin.
12. Bench on which trimmings are removed from fatbacks.
13. Machine for skinning fatbacks. Fat from 13 is trucked to cooking tanks on killing floor.
14, 15, 16. Trucks on which trimmed loins are immediately taken from cutting floor to sales floor.
17. Elevator by which product on trucks is taken to sales floor.
18. Bench which receives trimmed bellies from end of moving table for sorting and grading.
19, 20, 21. Trucks on which bellies are placed.
22. Electric saw for removing front foot from shoulder and cutting shoulder into parts, which drop through chutes to sales floor on first floor.
23. Electric saw for removing hind foot from ham. Ham is placed on moving table and carried to 24.
24, 25, 26. Here hams are trimmed and sent through chute 27 to sales cooler on floor below.
28. Trimmings from 22-26 are dropped onto long stationary table for grading and skinning.

New System

1A. Same operation, but electric circular knife is used.
2A. Same as 2.
3A. Same as 3.
4A. Same, but with electrically driven circular knife.
5A. Same as 5.
6A. After rib is removed, instead of going back on moving table, bellies go to smaller moving table (29) which runs in reverse direction.
7A. 8A. 9A. Position for trimming of bellies, now on reverse belt.
10A. Same as 10.
11A. Positions in which loins are now skinned and trimmed.
12A. Bench on which trimmings from loins are now cut into pieces for skinning.
13A. Same as 13.
14A, 15A, 16A. Trucks on which trimmed loins are removed to elevator. Note decrease in length of travel.
17A. Same as 17.
18A. Bench now receives trimmed loins for sorting and grading.
19A, 20-A, 21-A. Truck on which bellies are placed, to be removed as accumulated.
22A. to 28A. Same as before.



Government inspectors examine the viscera. Movement of conveyor pans is co-ordinated with movement of carcasses shown in the rear

550 hogs an hour, as the speed of the conveying system throughout the rest of the dressing operations is co-ordinated to the speed with which the carcasses come through the dehairer. Ordinarily, however, the run is at a lower rate, usually around 275 per hour. Operations in the dressing room, of course, are designed to give a high degree of efficiency by strict specialization. Government inspection is provided at three points.

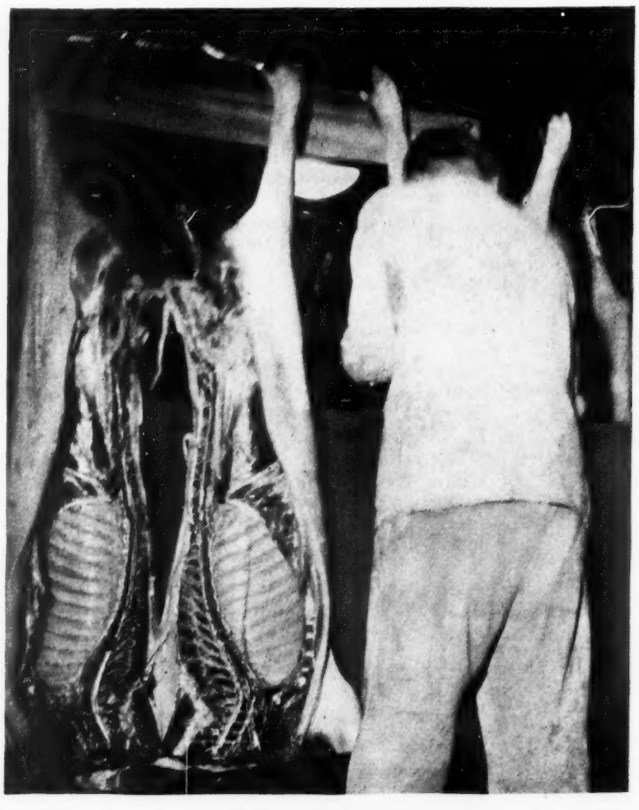
The chilling room in the Manhattan plant, with a capacity of 24,000 hogs per week, was ample for the new grouping. The carcasses remain in this room from 18 to 48 hours before going to the cutting table.

Probably the most marked changes for the new alignment were those made to increase the production efficiency of the cutting room. A comparative chart and table showing how mechanization of cutting equipment was combined with rearrangement of product flow to eliminate needless interior trucking is shown on the preceding page.

Under the old system, the pork loin cuts, which must go to the sales floor immediately, left the moving table for trimming and were loaded on trucks at a considerable distance from the elevator. The bellies, for the removal of which from the cutting room there was no immediate need, passed down the belt and remained on trucks for accumulation in a congested part of the cutting room. Now the bellies leave the main table and are placed on one moving in reverse, permitting them to accumulate on trucks in a corner where they do not interfere with product flow. The loins now go the full length of the main moving table and shorten the necessary trucking. With this arrangement it is possible to assure that all fresh cuts will be ready for delivery in the sales cooler on the ground floor early enough to assure final delivery by 8 a.m. Installation of an electric cutter in place of a hand cleaver for splitting the side into loin and belly solved a personnel problem caused by the dependence of the whole sequence of the cutting operation on the strength and skill of an operator capable of performing this task by hand.

As all the curing operations are now concentrated in the Manhattan plant, the curing room has been redesigned to provide the necessary capacity. It now holds 700,000 lb. of meat as packed in vats with curing mixtures for the 20- to 40-day curing period.

Specialized dressing operations on the carcasses take place in rapid succession



Scrapping of equipment formerly used for sausage manufacture in the Manhattan plant gave floor space necessary for the concentration of operations on sliced bacon. By locating the slicing and packaging room on the fourth floor, adjacent to the freezer, rather than on the sixth floor, where it had formerly been, considerable needless interior trucking was eliminated. The sixth floor space is now used for an additional smoked meat hanging room. This change has raised the capacity of the bacon-slicing operations to about 100,000 lb. in eight days, a 50 per cent increase. The smoke houses themselves, extending up six stories, have sufficient capacity to meet this demand without alteration.

Equipment for lard manufacture in the Manhattan plant also was left unchanged. This consists of three Laab melters with a capacity of 5,000 lb. each for disintegrating the fats, mixing tanks, filter press, and lard roller. A considerable portion of the production is sold in packaged form. Other equipment for disposal of byproducts, including a Laab melter for scrap, a blood dryer, sliming machines for cleaning intestines, and the like, was not affected in the shift to specialization, as these operations had always been concentrated in the Manhattan plant. In the Brooklyn plant, the increase in production efficiency accompanied by the unification of operation and management met the necessary increase in output without any extensive equipment changes.

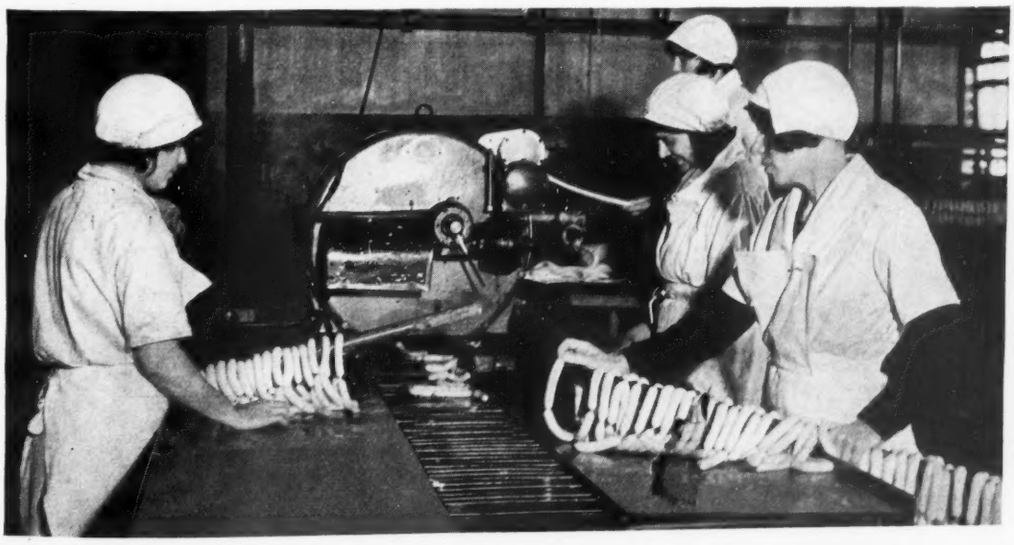
One of the most promising sources of savings as a result of the shift—one in which the economies are still being developed—is the method of distributing products from the two plants. Under the present system, orders are filled from the plant in which the bulk of the products ordered are made, whether or not it happens to be the nearest plant. The greater part of the company's output, the fresh cuts of pork, go from the Manhattan plant to meat dealers throughout the Metropolitan area in refrigerated trucks each morning directly after cutting, assuring perfect preservation. The quantity cut is closely adjusted to orders for the following day, but any excess can be sent with other raw materials for specialty manufacture in the Brooklyn plant.

Materials for processing operations in the Brooklyn plant are, of course, trucked from the Manhattan plant in considerable quantity. There is, however, no great transfer of products for sale from one plant to the other, although a supply of goods produced at the other plant is kept available at each of them to complete those orders in which the bulk of the goods desired is from the products of a single plant.

Skinning bacon which will later be sliced and packaged

A single garage at the Brooklyn plant has replaced the two garages formerly used. This has resulted in a material saving in storage charges, as well as placing cleaning and repair work under unified control.

As it now operates, the Manhattan plant is capable of producing about 2,000,000 lb. of fresh pork products and about 200,000 lb. of smoked pork a week. In the Brooklyn plant, about 500,000 lb. of pork per week can go through the processing operations if the demand requires. Of course, the full benefits of the change to operating unity are necessarily gradual in materializing.



Filling and linking pork sausage

Steam Pressure OR *Temperature*

WHICH IS NEEDED?

By P. W. SWAIN
Associate Editor of Power

The habits of steam have for years been studied and classified by power engineers. More general application of this information to food plant processes will improve products and save much fuel. In particular, a study of pressure-temperature relations may lead to greatly improved processes.

THE writer's background for this article is twofold: He is familiar with the way steam acts under various conditions. His knowledge of food is limited to the amount absorbed in consuming three square meals daily. That should clear the atmosphere right at the start, and prevent disappointment at failure to exhibit any new tricks in food technic.

However, a pound of steam acts like a pound of steam, whether it finds its way around in a soap plant, an oil refinery, or a canning factory. Therefore, one who has observed its ways may tell something of its unchanging habits and leave to the reader the problem of utilizing these habits for his own benefit.

Now for a few elementary facts. *Steam* is water vapor, a completely invisible gas, like air or hydrogen. The white cloud popularly called "steam" is in reality a mist of fine drops of water, differing from steam as completely in its properties as liquid air does from the air we breathe. This mist generally is mixed with true steam. When true steam (the invisible vapor) blows into the atmosphere, some always condenses into these minute drops; hence the almost universal conception of steam as a "white cloud." We never get a look at the pure stuff.

Next take *heat*. The practical steam user generally uses the terms *heat* and *temperature* interchangeably. This is good enough for some purposes, but the loose thinking that often goes with it is a great money waster in process plants.

Bill Smith demands high-pressure steam for his kettle (or tank, or whatever it is), because it has more "heat" than low-pressure steam. Perhaps he really knows what he wants in spite of the loose terminology. If so, all right; high pressure will give him the temperature. But if he really wants what he says he wants—*heat*—the low-pressure steam has almost as much as the high.

Turn to the Keenan steam tables,[1] latest U. S. authority, or to the accompanying summaries (Tables I and II). At atmospheric pressure (zero gage pressure, or 14.7 lb. absolute) the heat in one pound (weight) of steam, measured above water at 32 deg. F., is 1,150 British thermal units. Shoot the pressure up to 100 lb. gage (about 115 lb. absolute), and the heat becomes 1,189 B.t.u. The difference is hardly worth bothering about.

But perhaps Bill doesn't mean the heat *in* the steam, but the rate at which he can *pump heat* into the process. He is after production. All right; we will take it that way and figure what happens, first asking whether it is an open or closed process.

In an open process, as I am using the term here, the steam is blown directly into the water or other liquid to be heated, this liquid being in an open tank or kettle. Here the argument for high-pressure steam is pretty slim.

Granted enough pressure (say, 5 or 10 lb.) to force the required amount of low-pressure steam through the pipe, there is little difference. The moment the high-pressure steam leaves the pipe it becomes low-pressure steam. It will come out slightly superheated and remain so for an instant. But the amount of this superheat will be too slight, and its duration too short, to have any appreciable influence upon either the temperature of a process or its speed. The water will heat just as fast as, and no faster than, if a slightly greater amount (say, 4 or 5 per cent more) of low-pressure steam were blown in. Even this 4 or 5 per cent is not waste, because the low-pressure steam takes just that much less heat per pound to produce.

Suppose all steam must come directly from a boiler without passing through an engine or turbine. Suppose that the only alternative is high-pressure steam versus low-pressure. Suppose also, which is entirely reasonable, that the boiler, whether low-pressure or high-pressure, has the same efficiency—70 per cent, for instance. Neglect the loss of heat from transmission lines as affecting both cases equally. Then the quantity of coal burned will be the same in both cases, and the process will heat with the same rapidity. So the difference is that between Tweedledee and Tweedledum, except that smaller pipes will carry the high-pressure steam required, because it is more dense, more "compact."

Why, then, so much talk about pressure, if you can't go wrong? Two things enter here. The first is that frequently it is possible to get the necessary low-pressure steam from the exhaust of an engine or turbine, or from a "bleed" point of a turbine. Exhaust or bled steam has already earned its board and keep in power

[1] Published by the American Society of Mechanical Engineers, 29 West 39th St., New York City.

production. It is, therefore, far cheaper than high-pressure steam taken directly from a boiler. Under such conditions every pound of high-pressure steam used, when a pound of low-pressure steam is available, represents a definite waste of coal.

The other point is that still other factors enter in if the process is *closed*; if, for example, the steam is blown into a liquid under pressure in a closed tank, or passed into a pressure jacket surrounding a cooking kettle. These two cases should be considered separately.

Steam bubbled into water in an open tank will heat the water to 212 deg. F., and no higher. If the tank is full of some thick liquid, the temperature may be a few degrees higher, because substances in solution raise the boiling point. Water in a closed tank containing steam will heat up to the temperature corresponding to the pressure (see Table II).

If a temperature higher than 212 deg. F. is needed, a higher pressure will be required. Table I shows that to get 250 deg. you must have a pressure of 15.1 lb. gage. To get 300 deg., 52 lb. is necessary.

Now, as has been pointed out and is perhaps obvious, the writer is no food expert. It is not for him to say whether you need temperature as well as heat. But here are some questions:

Are you trying to evaporate, or are you trying to produce chemical changes by temperature? They are two entirely different things. If you are merely trying to concentrate by evaporation of moisture, you can do it as effectively at 212 deg. F. as at 250 or 300. If, on

Table I—Steam Pressures Required to Produce Various Temperatures

(For temperatures of 300 deg. and above, pressures are given to the nearest pound)

Temperature, Degrees F.	Pressure, Pounds per Square Inch Gage	Absolute
150	—11.0	....
200	— 3.2	....
212	0	....
250	15.1	....
300	52	....
350	120	135
400	223	247
450	408	423
500	666	681
550	1031	1045
600	1530	1545
650	2197	2211
700	3082	3096

the other hand, you are trying to produce a special flavor, or dietary value, by a certain temperature, then pressure counts. Just how much, is a matter you food technicians must determine. One thing I can say: that is, that the power engineer can give the food producer pressures up to 1,400 lb. (588 deg. temperature) any day he wants to try them. These pressures are used commercially in several American power stations.

You can, of course, get much hotter steam without high pressure by the simple process of superheating it; that is, heating it after it has left the water in the boiler. However, superheated steam is decidedly limited in its process applications, because the steam quickly loses its superheat when it comes in contact with the material to be processed or the walls of a heating jacket. In losing this superheat it gives up very little of the heat which has been put into it by the fuel burned. Being no longer of value as a high-temperature heating medium, it must be thrown away, with great loss, unless it can be used for low-temperature heating somewhere else.

Closed-jacket heating offers a similar temperature problem. The temperature within a steam jacket is that given in the table—no more, no less. The liquid will eventually rise to practically the same temperature.

Table II—Properties of Steam at Various Pressures (Based on Keenan Steam Tables)

Gage Pressure Lb. per Sq.In.	Temperature, Deg. F.	B.t.u. per Pound—Heat of the Liquid	Heat of Evaporation,	Total Heat
0	212	180	970	1150
10	239	208	952	1160
20	259	228	939	1167
30	274	243	928	1171
40	287	256	919	1175
50	298	267	911	1178
75	320	290	894	1184
100	338	309	880	1189
150	366	338	857	1195
200	388	362	837	1199
300	422	399	804	1203
400	448	428	776	1204
500	469	452	752	1204
600	488	475	727	1202
800	520	514	682	1196
1000	547	548	641	1189
1200	569	579	602	1181
1400	588	606	566	1172

However, with the jacket, low pressure does appreciably slow down the operation. Flow of heat from steam through a jacket wall to a liquid is proportional to the difference in temperature between the fluid and the steam. Higher pressure increases the temperature of the steam. With it the difference in temperature is increased and the rate at which heat may be made to flow.

On the other hand, the flow of heat from steam through a jacket to a liquid is extremely good, even with moderate temperature differences, so that low-pressure steam will produce sufficiently rapid heating for most practical operations where there is not actual need for some temperature considerably higher than 212 deg.

The use of the temperature and pressure columns in the two tables should now be clear. Table II contains, in addition, columns for "heat of the liquid," "heat of evaporation," and "total heat." The first is the amount of heat required to raise one pound of water from 32 deg. F. to the stated boiling temperature. Heat of evaporation is the additional heat required to evaporate the water. Total heat is the sum of these two.

When steam is used in process these heats are given up in the reverse order. First the steam condenses, giving up the heat of vaporization. To get out the full heat of the liquid the condensate would have to be cooled to 32 deg. F., which is rarely practicable. In cooking operations you cannot count on getting any more heat after the steam has condensed.

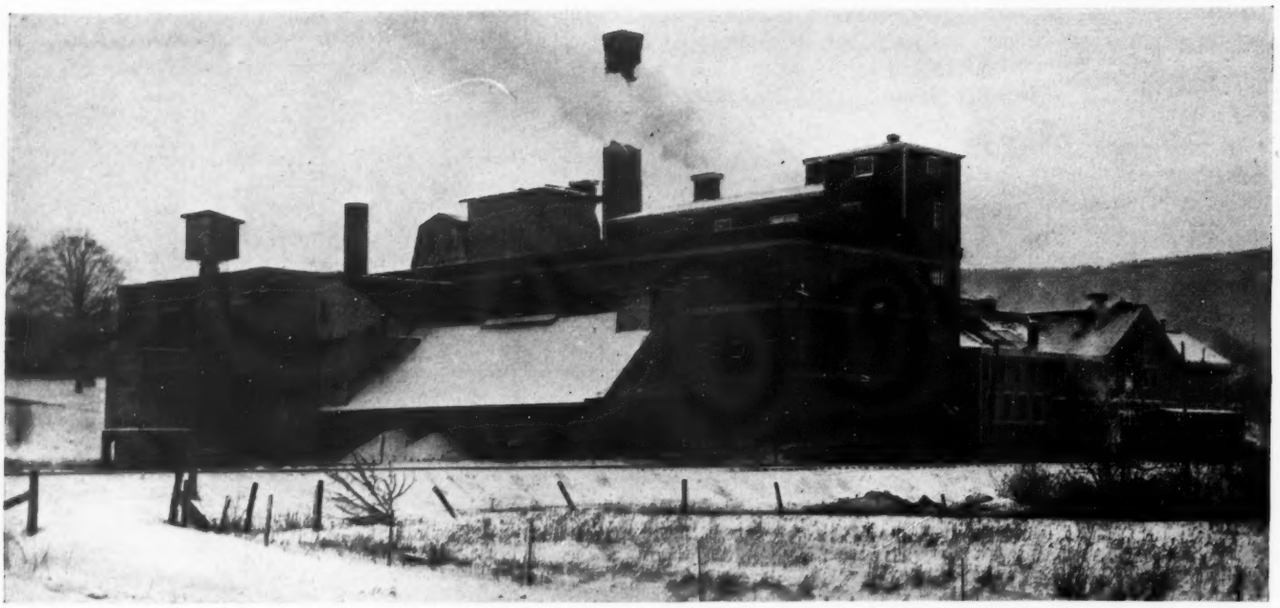
There is not space here to discuss this matter further. A future article will show how steam data may be used to estimate the quantity of steam required for various heating and cooking operations.

▼ ▼

Detecting Neutralization of Milk

IN ORDER to protect consumers as well as producers of sweet cream and milk against a sour product which has been "treated" by the addition of chemicals to neutralize the acidity, it is sometimes desirable for food inspectors to test dairy products for the presence of "neutralizers." The several methods that are in general use for detecting the neutralization of milk or cream are not entirely adequate; they will detect neutralization only when it has been excessive or carelessly done.

With the aim of finding a more reliable method, work has been conducted on this problem by K. G. Weckel and H. H. Sommer, of the dairy department of the University of Wisconsin. Of the several methods tried, that of Tillmann, it was found, offered the most promise. This method has been modified to make it simpler and more accurate. Preliminary results with this modified method indicate that neutralization can be detected and its extent measured to within less than 0.02 per cent acidity.



Casein plant of the Sheffield By-Products Company, Hobart, N. Y.

Advances in Processing Aid

DOMESTIC CASEIN

By F. L. CHAPPELL
Manager, Sheffield By-Products Company, Hobart, N. Y.

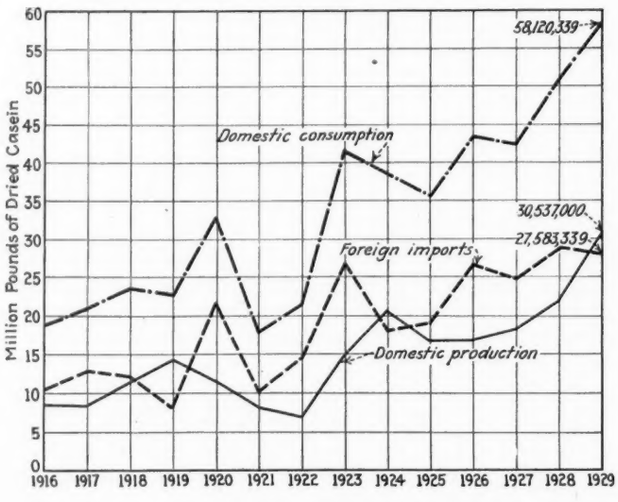
ABOUT 60,000,000 lb. of casein, it is estimated, was consumed in the United States in 1929, about 80 per cent of which went to the paper trade. With but one or two exceptions, imports have exceeded domestic production each year during the past decade. By far the greatest part of imported casein has come from Argentine manufacturers, to whom standardization of product and ability to deliver large quantities of a definite grade has given a considerable advantage over the domestic producers.

At the close of the World War, the domestic casein industry was left in an unhealthy condition with large inventories of high-priced casein on hand. Four or five kinds of casein were being produced and probably close to 50 per cent of production was in small plants, operating only a few weeks each year during the flush of milk production. Little or no attention was paid by most of the plants to the quality of casein produced. The other 50 per cent, more or less, was produced in a few of the larger plants.

Most of the domestic product was a muriatic cooked curd casein. Although the cooking and washing process removes the free acid to a large extent, high ash still causes the dissolved casein to turn to a jelly when cooled, which interfered with satisfactory spreading of the mixture on paper. Owing to the better flowing qualities of imported casein, our industry was losing some further ground.

Being a lactic-acid product, casein from the Argentine contained large quantities of free acid, sometimes as much as 15 per cent. It also was rather heavy in ash, but as the free acid helped to counteract the ash content and gave a thin flowing mixture, these impurities were

Casein Consumption and Production
(From U. S. Department of Agriculture Statistics)



overlooked and, perhaps, accepted as a necessary evil.

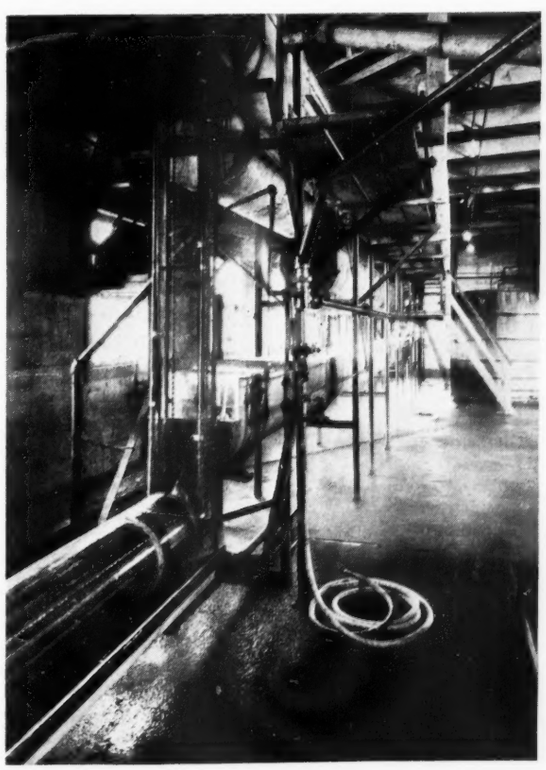
The classical method of testing casein to establish its suitability for coating paper was to see if it would dissolve or "cut" with 15 per cent borax. However, when Argentine casein began to arrive in large quantities and at a low price, many coated-paper manufacturers found that by adding more alkali, a casein which would not "cut" with 15 per cent borax could still be used.

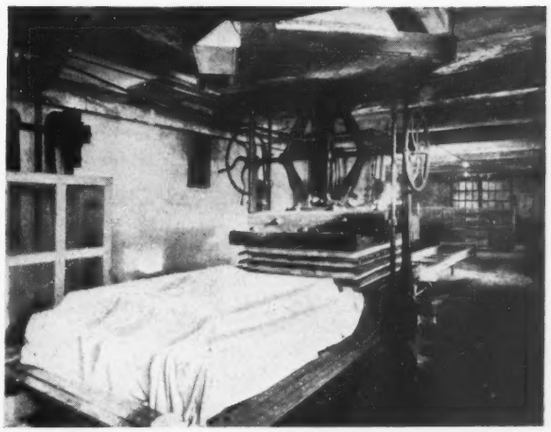
When a high-acid casein is used with satin white in casein glue for coating paper, the decreased hydroxyl concentration causes the satin white to become curdled or ropey, so that it will not spread on paper. It is customary to increase greatly the alkali to cut this casein, in order to maintain the hydroxyl concentration at such a point that the acid or salts present will not cause curdling, but this causes foam, which breaks on the drying lines, leaving pinholes.

To cure the pinholes, sulphonated oils, pine oil, and other anti-froth compounds are needed. It is apparent that this whole cycle is a case of doctoring the effect instead of removing the cause. A casein low both in acid and in ash, and of uniform quality was certainly needed.

During the war, the U. S. Department of Agriculture sent men into the field to try to produce a purer casein for the manufacture of airplane glue. Their first step was to find the proper agents for removing the ash. It was found that when the hydrochloric acid was properly applied to the curd precipitation, removal of the milk salts by washing with water could be satisfactorily accomplished. These experimenters produced a few tons of casein at our plant with an ash content of less than 2 per cent and an acid content of about the same. At that time, it was declared to be the purest and strongest of any commercial casein produced. But because the labor cost was high, the drying process slow, and the casein loss heavy, the process was abandoned for the time being.

The 40-ft. mixing trough and 14-ft. revolving screen in which the curd is treated with acid and isolated. Similar units are used for washing the product





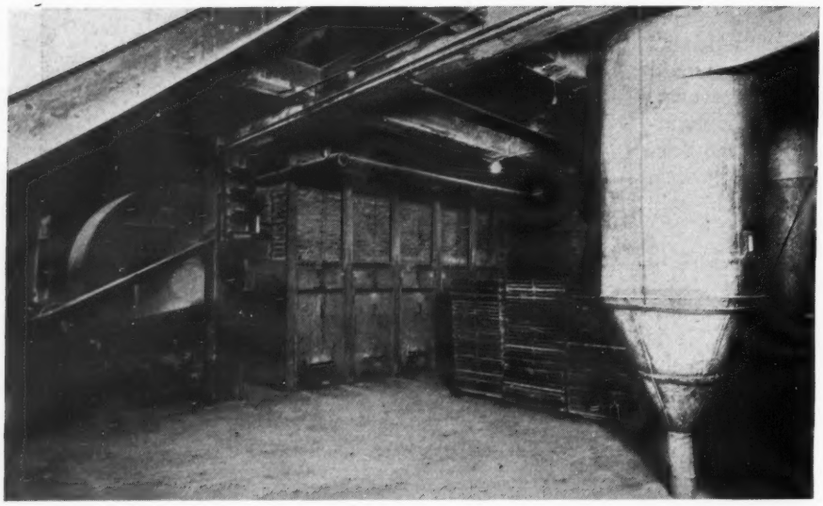
Casein press in operation. Experiments on continuous methods for water removal are under way

Close co-operation of the Bureau of Dairy Industry with the producers gradually led to improved methods for producing this "new process" casein, which could be sold at a premium. The real starting point for manufacture of this pure casein in large quantities, however, came with development of the continuous process of manufacturing. With this system, one man can isolate, wash, and drain the casein from three to four hundred cans of skim milk per hour with very little variation in impurities.

The construction and operation of the continuous system is very simple. It consists of one 40-gal. acid storage jar and one 10-gal. jar which is fed from the storage jar. The acid level is maintained in the smaller vessel by means of a float valve to assure uniform flow to a mixing vat. This mixing vat is about 20 in. wide, 30 in. long, and 12 in. deep, and contains a number of baffles. The vat, jars, valves, and float are made of acid-resistant earthenware. The hydrochloric acid is diluted with 3 or 4 parts of water to give more accuracy in mixing with the milk. Milk is pumped from a heater into the mixing vat by means of a centrifugal pump through a 2-in. or $2\frac{1}{2}$-in. pipe with a gate valve at the discharge end. This valve is slightly closed to give a back pressure that will produce a uniform flow into the mixing vat. An open type milk heater equipped with a float valve may also be used to assure uniform flow.

THE milk is fed into the mixing vat at 110 deg. F., at the rate of 350 cans per hour. The acid is fed into this vat in sufficient quantity to give about 0.5 per cent acid on the whey. This mixture flows into a 40-ft. long mixing trough, equipped with a standard 14-in. worm conveyor. The conveyor is so timed that it takes 15 minutes for the skim milk-acid mixture to reach the other end of the conveyor. Here the whole mass passes through a breaker to break up any lumps of precipitated curd that may have formed and prepare it for washing. At this point the material passes into a revolving brass screen 14 ft. long, which separates the whey from the curd. The whey is caught in a vat which fits under the screen and is carried off in a pipe.

The curd drops out of the lower end of the revolving brass screen to another worm conveyor and about the same quantity of water is added as there was whey



Drying kilns at the Sheffield plant. A continuous dryer to operate at 300 deg. F., which will dry and cool the casein in approximately 50 seconds, is planned for the near future

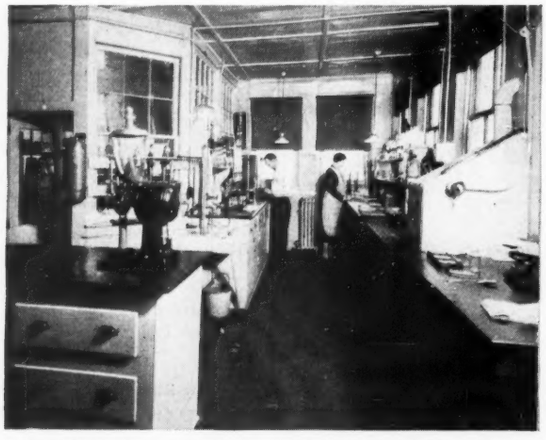
removed. If only one washing is required, we use about 80 ft. of worm conveyor timed to give the curd 40 minutes in the wash water. In case more than one wash water is desired, we use two 40-ft. conveyors and two screens. From the last screen, the casein is dropped on the press, if the elevation of the screen will permit. Otherwise, it is dropped into a vat and either shoveled or conveyed to the press. The machine can be built for any capacity desired. The 300- or 350-can units require 5-hp. motors and one man to operate. The labor would be the same on any size machine. Time required to precipitate and wash the casein ready for the press is about 55 minutes.

We are now satisfied with this arrangement for isolating and washing casein. The problem now is to develop improvements for completing the continuous manufacturing process. We are working with a centrifugal manufacturer on a suspended-type centrifugal with a closed basket and a special unloader, which is supposed to cut the casein ready for the dryer. This is a batch operation and, owing to a lack of continuous operation, is not entirely satisfactory, but at present it seems to be the only thing in sight.

We also expect to have in operation in the near future a continuous dryer of simple construction, self-operated and controlled, which will operate at about 300 deg. F. and require from 40 to 60 seconds to dry and cool the casein.

Casein must be handled quickly, as is the case with all other milk products. That dried by our present system of spreading on trays and heating for several hours in a dry kiln at low temperature has a tendency to decompose if spread too heavily. This causes trouble in the paper mills with froth, which in turn causes pinholes on the paper. Our theory is that casein should be dried very quickly down to about 10 per cent or 15 per cent moisture, and should be cooled quickly to room temperature.

I believe that there is a large field for engineering work and a practical continuous casein dryer and press. We are very much interested in better equipment and better product, and I believe that every producer should be interested at least in a better and more uniform grade of casein to supply our American trade, no matter what method is used for preparing it. Our foreign competitors cannot produce the quality of casein which we can, but they do standardize their product and are able to deliver large quantities of uniform quality. When this same standardization is added to the present advantages of the domestic product the figures for domestic production and consumption undoubtedly will draw closer together.



Close laboratory control is maintained over the processing operations

Determining Swelling Rate of Canned Foods

By W. S. STURGES, E. T. DRAKE, and L. B. PARSONS

Laboratory, The Cudahy Packing Company Omaha, Neb.

IN THE investigation and development of canned food products, the technologist is continually faced with the problem of changes, both biological and chemical, occurring either singly or simultaneously. A valuable guide for following the progress of certain of these changes is to be found in a quantitative method for measuring swelling rates. From data of this character considerable information of a diagnostic nature becomes accessible, and significant details become apparent which are entirely overlooked in the usual positive or negative statement of swell. The old traditional methods of pencil tapping, thumbing, or shaking are of very limited application in storage or incubation tests, since more frequently than not, two observers will argue whether a can is more swollen than it was a week before. In making comparisons of various cans over an extended period, such methods are valueless.

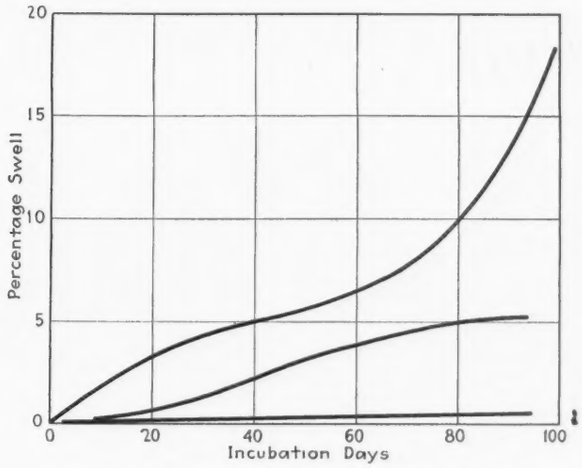
Since no method for quantitative measurement of the swelling rate was found in the literature, the following was devised to meet this particular need. It is simple, accurate, and useful for routine as well as research applications.

The principle of the method is the familiar one of determining density by weighing under water. It is obvious that the change in density of a given sealed container will be a measure of the increase or decrease in volume of that container. This can occur in canned foods only because of evolution or absorption of gases.

A large rough balance of an accuracy of 0.1 gm. is arranged so that a fine piano wire can be attached to the bottom of one pan and passed through holes of suitable size drilled through the base of the balance and table top. The wire terminates in a small hook which engages a small copper loop previously soldered to the cans to be tested. The wire, immersed in water to the operating level, is carefully weighed and a tare made and added permanently to the weights in the other pan. The container is of a suitable size to accommodate the type of can to be tested. It is equipped with an electric heating element of 100-200 watts, a thermometer, and an air stirrer. It has not been found worth while to arrange thermostatic control, since manual control to 0.5 deg. C. is sufficiently accurate.

When the bath has been adjusted to the temperature at which incubation has been carried out, the can is quickly immersed in the water, care being taken to avoid entrapment of air under and along the flanges of the can, and the weight is determined by adding suitable weights. It is advisable to turn off both air and electricity during the weighing operation, because the system possesses considerable inertia and slight disturbances upset the equilibrium. If the wire is sufficiently fine, no especial care need be taken to have the water level exactly constant, since the error involved is only the weight of a section of wire corresponding to the difference in level.

For all practical purposes it is sufficient to assume that the density of water is unity at the operating temperatures. To determine swell, it is necessary only to measure the weight of a given can under water at various intervals, the decrements in weight in grams being equivalent to the swell in cubic centimeters. If it is desired to calculate the percentage swell of a given can, it is necessary to know the approximate initial volume of the can. This, of course, involves simply weighing the can in air.



Swelling rate curves of different character from three cans of the same type product

Following are the simple relations involved:

W_{air} = weight of can in gms. in air
W_{water} = initial weight of can in gms. in water
V = initial volume of can
D = average density

$$V = W_{air} - W_{water}$$

$$D = \frac{W_{air}}{W_{air} - W_{water}}$$

If W = the decrement in weight in water the percentages swell S is

$$S = \frac{W \times 100}{V}$$

The method has been found capable of definitely showing variations of 2 cc. in volume on cans of 3,000 to 4,000 cc. capacity, provided precautions are taken to have the can initially at the temperature of incubation, and also provided care is exercised to see that no opportunity is given the can to cool appreciably before making a determination. It has not been found worth while to make corrections for the difference in density of water with variations in temperature, since a simple calculation suffices to show that an error not exceeding 1 per cent of the values obtained is here involved.

The table gives a tabulation which has been found useful for recording and calculating data on swelling rates.

Rate of Swelling of Can

W air = 3,683 gm.
W water (initial) = 441 gm.
V initial = 3,242 cc.

Days Incubated	*W* Water	*W*	$\frac{W \times 100}{V}$	Remarks
0	...	...	....	Not weighed
1	441	...	....	.....
6	439	2	0.06	.....
10	438	3	0.09	.....
12	432	9	0.28	.....
20	421	20	0.62	.....
21	420	21	0.65	.....
27	412	29	0.90	Flat
41	369	72	2.22	Springer
50	338	103	3.17	.....
65	310	131	4.04	.....
89	274	167	5.15	Soft swell

The graph shows swelling rate curves of widely different character obtained on three cans of the same type product.

Starch

EXPLOSION HAZARDS REDUCED

By Safety Measures

MODERN building construction, the installation of equipment with a view to safety, and excellent plant housekeeping demonstrated great advantages at Decatur, Ill., by restricting the damage caused by the explosion in the starch plant of the Staley Manufacturing Company which occurred last September. A report on this subject by D. J. Price and H. R. Brown, of the chemical engineering division of the Bureau of Chemistry and Soils, made in the January, 1931, Quarterly of the National Fire Protection Association, discloses as much as can be learned regarding the technical factors involved. These investigators, who were given every facility for a thorough study by the A. E. Staley Manufacturing Company, present conclusions that appear to have wide application in many divisions of the food industry.

The explosion and resulting fire at Decatur occurred in a starch house where dry starch from the drying kilns was being handled by an air conveyor system from a dumping pit to the sifting reels on an upper floor. The initial explosion unquestionably was in the conveyor and consisted of suspended starch burning in air. The cause of ignition could not be determined. The report indicates four main theories as to possible cause, namely:

1. Sparks from nails or metallic substances entering hoppers and feeders at starch dumping pit.

2. Electrical sparks from *(a)* motors in pit, and *(b)* motors or other electrical equipment on first floor.

3. Static electricity in starch handling system.

4. Sparks from fans on return air side of starch system.

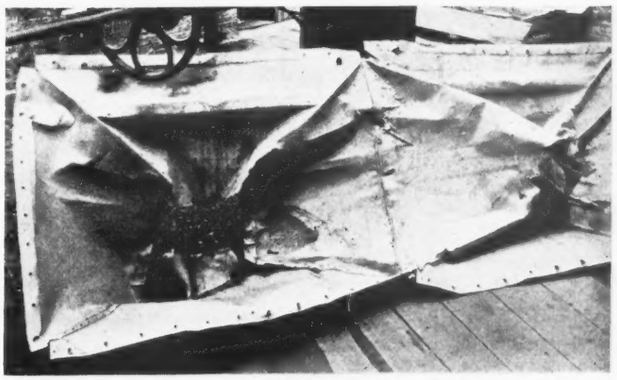
The fire which was initiated by the explosion occa-

Damage to buildings of starch plant at Pekin, Ill., after explosion in 1924 in which 42 persons were killed and damage of $750,000 extent was done

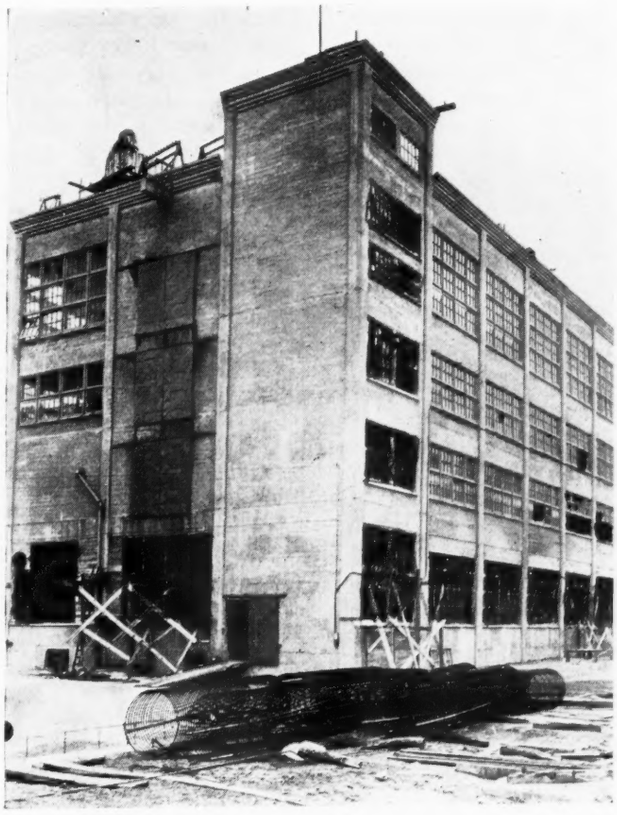
Effect of starch explosion at Cedar Rapids, Iowa, in 1919, in which 43 persons were killed and all buildings were destroyed with $3,000,000 damage

sioned a secondary minor explosion of sulphur in the sulphur elevator which passed through the section of the building from which the starch conveyor was torn down by the initial explosion. The consequences of the explosion were practically confined to the starch house, particularly to the first floor, where the dumping pit is located, and a nearby stair well which extended from this floor to the roof of the building. Of the sixteen men at work on the first floor, six were so severely burned that the results were fatal. None of the other employees of the plant or in other buildings suffered injury. It is estimated that the total property damage was approximately $5,000.

The plant layout, the extent of the building damage, and the complete wrecking of the conveyor itself are all evident from the illustrations. The results so shown for Decatur are in striking contrast with the devastating starch-plant disasters of Pekin, Ill., and Cedar Rapids, Iowa, which occurred some years earlier. The two earlier disasters of the starch industry in each case resulted in the death of over 40 men and money losses many times the Decatur loss. In 1919 there was practically complete destruction of the plant with explosion and fire loss of approximately $3,000,000. The 1924 explosion is charged with property damage of about $750,000. In both cases, as is evident from the photographs, almost complete destruction of a number of buildings occurred. And even the best built structures suffered severely.



Starch hoppers from Decatur plant, showing how explosion completely ruined near-by equipment, although damage was localized

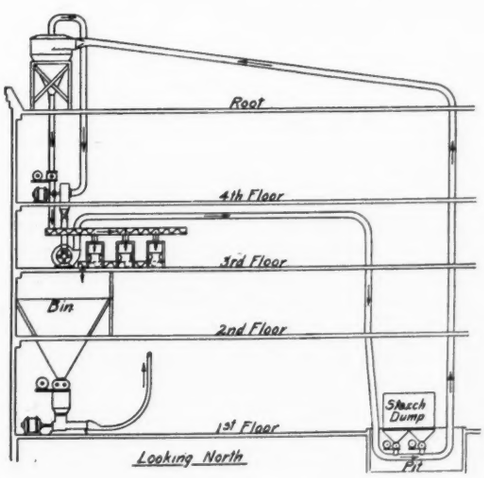


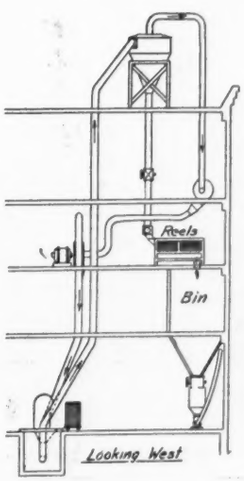
The starch explosion at Decatur, Ill., in September, 1930 shows how damage was minimized due to use of proper safety precautions

An outstanding advantage in modern factory construction is attained through the use of extremely large window areas. These areas vent the force of any explosion wave to the outer air, preventing building collapse or more serious structural damage which would otherwise spread the consequences to many parts of the plant.

A similar benefit comes from good housekeeping, which prevents the raising of dust clouds and the causing of secondary explosions throughout the remainder of the works following the first "pop." As in the case of coal mines, where rock-dusting prevents the formation of explosive dust clouds, so in factories, cleanliness and removal of dust from the works is highly important.

Food-plant executives interested in safety measures for control of dust explosions may communicate with David J. Price, chief of the chemical engineering division, Bureau of Chemistry and Soils, Washington, D. C. Mr. Price has been in personal charge not only of the Decatur investigation but also of numerous other dust explosions occurring in a wide variety of industrial establishments during the past decade. The technical information accumulated in the course of this work is available to all interested.





Layout of starch conveying system at Decatur plant, showing equipment to which explosion was confined

Rational Methods of

SCORING FOOD PRODUCTS

By WASHINGTON PLATT
Research Laboratories, The Borden Company
Syracuse, N. Y.

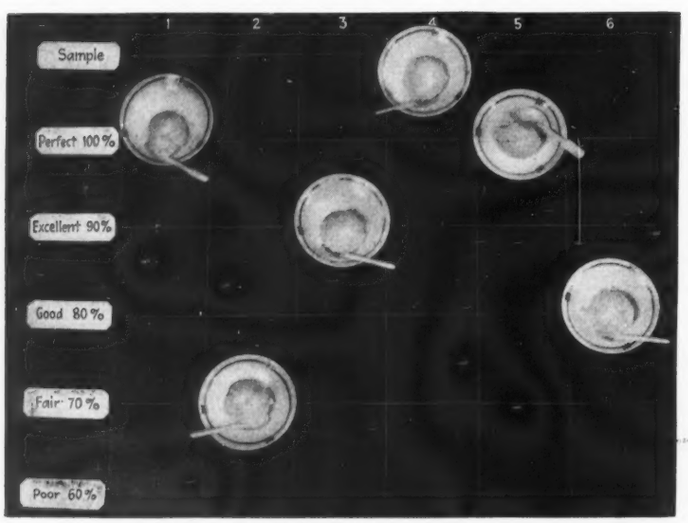
"EATING quality" of the product is one factor in the food industries that is of first importance and which can never be "measured" in the usual meaning of the term. Although such essential qualities as taste, odor, and texture cannot be measured by ordinary chemical or physical means, they can be very accurately determined by the process of scoring when this is carried out correctly. A proper system for scoring develops accuracy and confidence in the measurement of the quality of products. On the other hand, incorrect methods for scoring may be worse than none at all, often leading to conclusions which are false or misleading.

A thoroughly reliable system of scoring is of value to the superintendent, laboratory, production manager, sales manager, purchasing agent, and higher executives of the company. It is, in fact, the only "yardstick" by which they can measure the most important characteristics of their product.

When any food is set before the consumer it makes an impression favorable or otherwise first by its appearance, then to some extent by its odor, and finally by its "eating qualities," which include the taste and other considerations. When food is scored, therefore, it is well to consider the whole impression which it will make upon the user. We may call this the "consumer appeal." For this reason, we should ordinarily include in our score card the appearance and the odor, as well as the eating qualities.

Under appearance we shall always consider "color."

Fig. 1—Scoring ice cream on a score board by position of dishes



For certain food products other special qualities are considered. Thus a loaf of bread is judged for symmetry, evenness of bake, break, and shred; buttermilk is often judged by the appearance of the film which it leaves on the inside of the bottle or glass; and in butter a mottled appearance results in a lower score.

A definite idea of the odor of a product is much easier to determine before the product is taken into the mouth, because in the mouth the odor is complicated by the taste. The value of the score card is greatly enhanced if the odor is carefully described under "remarks." For example, odors of dairy products may be sweet, sour, fishy, tallowy, rancid, stale, putrid. The more accurately these can be described, the easier it is to spot the trouble, if any, and to eliminate it. Ice cream is one of the few food products that have little odor, judged by the nose only, before taking into the mouth. This is because the strength of odors is greatly diminished in the cold.

"Eating qualities" of a food include all those sensations which the consumer experiences when taking the food into his mouth. There are three distinct factors. The first is the feeling of the food in the mouth, the so-called "tactile sensation." This is a matter of great importance. Two meats may have identical taste, but one may be tough and the other tender; two crackers may taste the same, but one may be unpleasantly hard while the other is short and crisp. In the case of cheese each kind has a certain definite feel in the mouth which the consumer expects and considers desirable. Anything different is undesirable, just because the consumer likes what he has become accustomed to, and does not like the unexpected in familiar foods. Evidently the feeling of the food in the mouth is closely related to texture; but the tongue is extremely sensitive and can detect differences in food which cannot be noticed by the eye except with the aid of the microscope. Thus the tongue can detect rough sugar particles in chocolate when these are too small for the eye to see. The consumer's tongue is in fact a very severe critic.

It is well known that our judgment of a food product is tremendously prejudiced by a previous knowledge of what it contains. Imagination plays a part which is impossible for any judge to eliminate, if he knows the identity of the samples he is tasting. In order to eliminate the unconscious influence of imagination it is essential that none of the judges know the identity of the samples being scored. This is the most important of all precautions in regard to scoring, yet it is most often overlooked or neglected.

Samples submitted for judging should be marked with a code number, such as "A", "B", and "C"; never with a mark indicating their identity such as "12 per cent" and "8 per cent," or "regular" and

special." If the maker of the samples be one of the judges, special care should be taken to keep the identity of his sample unknown to him; at best there are often some small points which enable the maker to identify his own batches.

When several people are scoring a set of samples at the same time, each should write down his score without indicating by words, gestures, or facial expressions his opinions to the others in any way until all have finished scoring. For many reasons it is much better, when possible, to have a set of samples scored by one person at a time.

A most useful practice is to include in the series of samples one or more sets of duplicates, these, of course, being unknown to the judges. This gives an excellent check on the reliability of each judge. As an example, if one of the judges marks a sample "off-flavor," but scores the duplicate sample as "good flavor," it shows that the opinions of this judge cannot be relied upon too closely, or if the sample gets a numerical score of 80 and the duplicate sample a score from the same judge of 85, we see that differences of five points in the scoring of flavor by this particular judge are within the experimental error and are not significant. When the number of samples to be judged is small enough to permit it, there is a great advantage in submitting in duplicate all samples for judging.

For sanitary reasons, individual paper or fiber cups, spoons, and plates are convenient and advisable when a large amount of sampling is to be done.

In scoring food products the 100 per cent standard at which we aim is that appearance, texture, odor, and taste which the public likes best. Therefore, our committee of judges is intended to represent the public and to tell us in advance what the opinion of the public will be. For this purpose we submit samples made with different raw materials or by different processes to a committee of judges, asking them to tell us which the public will prefer and how much one product is to be preferred to another. That the judges represent the public is the point of view that must not be forgotten.

It is evident that experts are not necessarily the best judges. An example of this is seen in some of the present-day judging of bread. A white crumb is considered desirable, but many expert judges, going far beyond the public demand, score bread down unless it has an almost chalky whiteness. Moreover experts are likely to overemphasize the very evident factors such as volume, color, or texture and to give less than proper weight to those most important, but elusive, factors of taste and odor.

Some people have marked idiosyncrasies in which their taste is widely different from that of the general public. Some like foods extremely sweet or highly flavored. Such people should be excluded from judging. On the other hand, in most organizations there are men who have proved from years of experience that they know what the public wants. Such probably will make good judges. So before a person is selected as a judge his ability to detect real differences in foods should be determined by trying him out—on known samples. In general a person's ability to discriminate decreases with age like his other senses. It pays to select the judges carefully, to instruct them fully in regard to the method of scoring, and to test them to determine their fitness.

The number of judges is important and depends largely upon the object of the test. Other things being equal, the larger the number of judges the more reliance can be placed on their scores. It is difficult to get together a large number of judges to score a set of samples, especially if the scoring must be done frequently. For this reason, preliminary conclusions should be submitted to about three judges. More important conclusions should be submitted to a larger number. Five or even ten judges are good for important conclusions, if that number of qualified persons are available. Samples on which final conclusions are to be based should be submitted to as many persons as possible. These should include women as well as men. For example, the samples could be passed around a large office, or they could be offered at a cafeteria. In this case the decisions to be given must be made as simple as possible.

The average person without experience or instruction cannot be expected to give an opinion on a number of points or to express carefully graded ratings. About all that he can be expected to do is to say that one sample is better than another, or that there is no appreciable difference. The number of samples submitted to a large number of untrained critics should never be larger than three and should preferably be two. Other samples should be eliminated beforehand by the regular judges.

As different characteristics are of importance for different food products, a separate standard card should be made out for each product. Examples of score cards for bread are given in Figs. 3 and 4. It will be noted that the characteristics should be set down in a definite logical order, starting with the appearance, then the odor, and last, those qualities that appear when the sample is taken into the mouth. In the case of bread, "external characteristics" must evidently be scored before the loaf is cut and the internal characteristics rated.

As a means of rating, the average man can express his opinions more accurately and consistently in words than numerically. For this reason, it is best to score the different qualities as follows:

Grade		Abbreviation	Numerical
Perfect	XX	No detectable fault	100
Excellent	E	Of unusual excellence but not perfect	90
Good	G	Average good market quality	80
Fair	F	Below average but not objectionable	70
Poor	P	Objectionable but edible	60
Bad	B	Highly objectionable; unfit for human food	50

After each rating ample space should be allowed for

Fig. 2—Sample score card corresponding to scoring system shown in Fig. 1

	FLAVOR	TEXTURE	BODY	COLOR
PERFECT	No detectable fault	No detectable fault	No detectable fault	No detectable fault
EXCELLENT	Highly pleasing above the average but not perfect. Slight excess or shortage of sugar or flavoring	Highly pleasing. Almost perfect	Highly pleasing. Slightly too heavy or too light	Highly pleasing. Slightly off in shade
GOOD	Average market quality, only slight defects in flavor of milk products or in flavor'g materials or low in fat.	Average market quality. Slightly coarse or excessive overrun	Average market quality	Average market quality. Too much or too little.
FAIR	Below average. Passable but slightly old or stale milk, cream or solids flavor. Any foreign flavor	Below average Sandy Coarse Lumpy Icy	Below average Fluffy Soggy	Below average Uneven Unclean
POOR	Objectionable Sour, Salty, Rancid, Garlic, Unclean or foreign flavor	Objectionable Marked defects in texture	Objectionable Snowy, Crumbly, Gummy, Icy	Objectionable
BAD	Unfit for food			

remarks. This should be filled in as fully as possible, especially under taste and odor. If the odor is "poor," for example, it is very helpful to know whether the poorness is due to rancidity, staleness, too much artificial flavor, or what not.

Judges ordinarily will mark down their rating by means of the abbreviations used and fill in "remarks" where pertinent. Numerical scores will not ordinarily be filled in by the judges. The numerical marking and averaging are described later in this paper.

IT IS worth while to print the description of the ratings on the back of the score card. This will make for uniformity and discrimination in the marking. It will prevent, for example, everything salable being marked "Excellent" or everything below standard as "Bad." The simplicity of this system is evident. For scoring any food the judge needs to bear in mind only the six grades given previously, which cover the whole range of desirability from perfect to bad. The meaning of each grade has been described and remains always the same. Consistent and accurate scoring then depends upon the ability of the judge to hold in mind an attainable ideal and his sense of proportion so that he will allot to each characteristic its proper rating based on this simple scale. Once this rating is correctly fixed, all calculations based on weights assigned to the different characteristics is purely mechanical.

The judges should be instructed (these instructions also may be printed on back of the card) to bear in mind that, where fine distinctions are to be made, + or — can be used in connection with the ratings mentioned. Thus, if two samples are both "Good" in flavor, and one is slightly better than the other, but not good enough to mark it "Excellent," then the better one may be marked G+ and less good G —. The instructions should provide that the samples be arranged in a row at the top of the score board in suitable containers, marked with a code number; the room be free from strong odors of any kind and plentifully supplied with fresh air; an abundance of cups, spoons, and the like be provided, together with a sink or waste can where discarded parts of samples can be disposed of; drinking water be provided for the judges; and that each judge proceed as follows:

1. Note the appearance of each sample and score all those physical points, of which color is an example, that can be determined without tasting or smelling the samples.

2. Make preliminary notes on texture, body, and other characteristics.

3. Smell each sample in turn. Those with a pleasant odor are placed near to the top, with the best highest. Those with an unpleasant odor are placed low; the more unpleasant they are, the lower they are placed. This gives a preliminary line-up of the samples on the basis of odor, with the better ones above and the poorer ones placed lower down.

4. Examine the samples again for odor, taking first those previously rated as of medium grade, examining these together and giving them a careful score in which fine distinctions can be made. Repeat this process with each other scoring group and pick out that with the least desirable odor. In some cases, this second examination of all samples will cause a sample to be shifted from one group to another.

5. Under "Remarks," describe the odor of each, noting faults especially.

6. Taste the samples. Place those having desirable tastes near the top and put those having less desirable tastes low, with the poorest lowest.

7. Repeat the examination for taste, taking the samples in groups as before. First examine the best group by themselves, then those in the middle group, then those in the poorest group. In tasting, it is always wise to taste the best group first, as disagreeable tastes interfere with fine discrimination between the better samples. A drink of water or a slight rest between the tasting of different groups is often desirable when many samples are to be scored.

8. Fill in "Remarks" under "Taste," describing the desirable and undesirable kinds of tastes noticed.

9. On the evidence of the feel of the samples in the mouth, added to the evidence from the external examination under step 2 give final score for texture or body.

10. Sign the score card.

The scoring board is a simple and convenient device to assist in scoring by the method just described. This is a large board ruled into squares and numbered as shown in Fig. 1. It may be made of cardboard, or beaverboard, or a sheet of wrapping paper on the table. It is used for placing the samples during scoring.

Most people express their ideas most accurately in words, such as "good," "poor," and the like. They do not find it so natural to express these same ideas by means of numbers. When numbers are used there are further complications in that different points in the score card usually are given different weights. Thus in judging ice cream, "Taste" is given 50 points; "Texture," 20; "Body," 20; and "Color," 10. In this system if each item is not quite perfect, it might seem fair to take off

Fig. 3—One type of score card used for bread

BREAD EXAMINATION REPORT

BAKERY -

ADDRESS-

Name of Bread

Wrapped Unwrapped

Labelled Weight

Smooth Split Long

Date Baked

Date Scored

Weight when Scored

External Characteristics	Score Perfect	Score Bakers	Remarks
1. Volume	10		
2. Color of Crust	8		
3. Evenness of Bake	3		
4. Symmetry of Form	3		
5. Break & Shred	3		
6. Character of Crust	3		
TOTAL	30		
Internal Characteristics			
7. Grain	10		
8. Color of Crumb	10		
9. Texture	15		
10. Aroma	15		
11. Taste	20		
TOTAL	70		
TOTAL SCORE	100		

Suggestions for Improving Bread:-

Comments on Keeping Quality of Loaf

Scored by-

2 points. This would not be really fair, however, for in the case of "Taste," we have scored it off 0.04, or 4 per cent, whereas in the case of "Color," we have scored it off 0.2, or 20 per cent.

The judges often are busy men. It is better to relieve them of the trouble of making out numerical scores, adding up the total, and taking averages. All of this can best be done by someone especially qualified to handle figures, either in the office or in the laboratory, or possibly the man who is in charge of the experiments to which the scores pertain.

Figures, however, are absolutely necessary for many purposes. For example, the "Total Score" of a product usually is of interest, this being the sum of the score for appearance, odor, taste, texture, and other qualities. Again it is often very helpful to average the scores of the different judges, thereby arriving at an average score which represents the composite opinion of a number of men and is, therefore, more reliable than the opinion of any one. Interesting curves can often be drawn similar to sales curves, showing the deterioration on storage or the improvement in quality from month to month. Totals, averages, and curves cannot be computed conveniently without the use of numerical scores.

Systems now in use for scoring food products are shown in the illustrations as examples of what is now being done, even though these scoring methods do not comply exactly with the system here described. An example of the value of scoring food products and an interesting discussion of this problem are given by L. C. Mazzola in FOOD INDUSTRIES, 1930, pages 111 and 214.

It is well known that even the best of chemical analysis will show differences when made in two different laboratories. Small variations which cannot be eliminated are inevitable. We say that such differences are not significant. We would be definitely wrong and we might fall into serious error if we based any conclusions whatever on analyses which are smaller than chemists can show with certainty. In exactly the same way there will be discrepancies in the score cards, except that these scores, being based on opinions and not on exact scientific analysis, will vary more than the ordinary chemical analysis. It is important that we realize that these discrepancies will always exist and that we should not base any conclusions on very small differences in the scores; that is, smaller than the so-called experimental error.

Calculations of the significance of differences are covered in discussions of Statistics, Probable Errors, and Precision of Measurements as given in Daniels' "Mathematical Preparation for Physical Chemistry," pages 220 to 225. The use of the method and table given there will save much time. For more complete discussions of this interesting subject see G. U. Yule: "Introduction to the Theory of Statistics," published by Griffen Company; or R. A. Fisher: "Statistical Methods for Research Workers," published by Oliver & Boyd.

In conclusion, it may be said that scoring is the only way to express many important qualities of food products. Scoring may be developed into a system of great precision and unique value. Such development requires the observance of a number of precautions set forth in this paper. Any manufacturer of food products who will take the trouble to develop such a system for his own products will find himself amply repaid for his trouble.

What follows will be of interest only to those who are to make the numerical calculations from the opinions which the judges have expressed on the score cards, such as "Poor," "Good," and "Excellent."

Scores have been assigned to the ratings used as follows:

Grade	Abbreviation	Numerical Scoring Expressed as Percentage or Perfect. Per Cent.
Perfect	XX	100
Perfect minus	XX—	97
Excellent plus	E+	93
Excellent	E	90
Excellent minus	E—	87
Good plus	G+	83
Good	G	80
Good minus	G—	77
Fair plus	F+	73
Fair	F	70
Fair minus	F—	67
Poor plus	P+	63
Poor	P	60
Poor minus	P—	57
Bad plus	B+	53
Bad	B	50

Note: The plus or minus ratings need not be used except when especially fine distinctions are to be made. These fine distinctions are often of great importance, but whenever they can be omitted the numerical work is greatly simplified.

The numbers given represent percentage of whatever weight is assigned as perfect for that item in the score card. Thus an ice cream score card shows that the total score of a perfect sample is divided as follows:

	Perfect Score
Color	10
Body	20
Texture	20
Taste	50
	100%

Now, suppose that the sample of ice cream which we are examining has the following rating: Color, E; Texture, G; Body, G; Flavor, F. Then the numerical score will be found as follows:

Color	E	90 per cent of 10 =	9
Texture	G	80 per cent of 20 =	16
Body	G	80 per cent of 20 =	16
Flavor	F	70 per cent of 50 =	35
		Total	76

After three weeks in the hardening room, the score might be:

Color	E	90 per cent of 10 =	9
Texture	P	60 per cent of 20 =	12
Body	F	70 per cent of 20 =	14
Flavor	F	70 per cent of 35 =	35
		Total	70

Fig. 4—Reverse of bread score card shown opposite

	Perfect		Faulty
1. Volume	Satisfactory		Too large or too small
2. Color of Crust or of Bloom	Golden Brown	(a) Reddish brown (b) Greyish (c) Pale Straw	
3. Evenness of bake	Evenly Baked	(a) Pale top, sides or bottom (b) Dark top, sides or bottom	
4. Symmetry of Form	Symmetrical	(a) Protruding sides or ends. (b) Flat top (c) Too high (g) Sharp corners (d) Too wide (h) Squatty (e) Too Narrow (i) Caved sides (f) Low ends	
5. Break & Shred	Shredded break	(a) Wild break at sides or ends. (b) Break on one side (c) No shred on ends (d) Blind shred (split top) (e) "Shell" crust	
6. Character of Crust	Tender, even surface & uniform thickness	(a) Highly glazed or varnish like (e) Too thick (b) Tough (f) Too hard (c) Leathery (g) Brittle (d) Checked or creased	
7. Grain	Close, even uniform	(a) Open (b) Not uniform (c) Thick cell walls (d) Coarse (e) Large holes	
8. Color of Crumb	Creamy white	(a) Chalky or dead white (b) Yellow (c) Grey (d) Streaked (e) Spotted	
9. Texture	Velvety or silky Soft & elastic.	(a) Rough (b) Harsh (c) Doughiness (d) Brittleness or Crumbly (e) Lumps	
10. Aroma	Wheaty odor, pleasant, sweet or malty.	(a) Acetic or Sour (b) Cheesy (c) Musty, moldy or ropy (d) Rancid	
11. Taste	Wheaty, nutty or pleasant.	(a) Too salty (b) Flat, no flavor (c) Too sweet (d) Acid or sour (e) Rancid (f) Cheesy	

Converting

WASTES *into* PROFITS

A Study of What Can Be Done With Tomato Pomace

By EARL D. STEWART
Assistant Editor

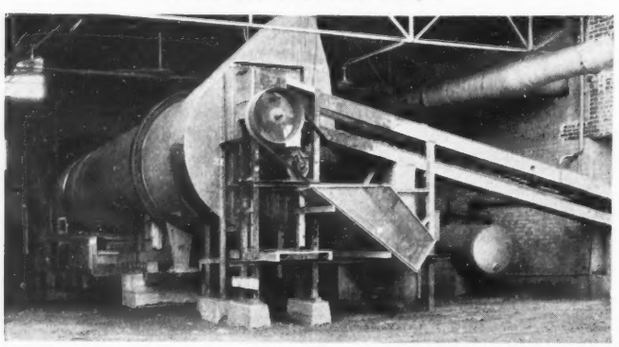
ECONOMIC disposal of tomato seeds and skins, the waste of the tomato pulping and catsup industry, is a problem of importance not only from the cost viewpoint but also from that of public relations. Tomato pomace, as this waste is called, is an organic material which if, allowed to decompose, may become very offensive. In spite of the fact that tomato seed recovery has been practiced in Italy for about twenty years and notwithstanding the excellent work of Shrader and Rabak in this country, American manufacturers of tomato pulp have been slow to take it up.

The study made by Shrader and Rabak about twelve years ago indicated that not enough tomato pomace was produced in any single limited area to render tomato seed recovery profitable, even though it was technically feasible. However, in 1927 one enterprising tomato-products manufacturer obtained a contract from a feed manufacturer for all the pomace that he could produce, provided that it was dry. The price agreed upon was quite attractive, but the tomato packer was unable to make delivery, because he could not dry the pomace.

The case under discussion involved dried pomace and not merely tomato seed alone. The manufacturer attempted to dry the seed in a rotary kiln drier, but the machine became plugged up, and no dry product was ever made commercially except the little that could be obtained by digging it out of the dryer by hand.

Several reasons may be ascribed for this failure. The soluble materials in tomato waste consist largely of sugar and a minute quantity of acid, a combination that is very difficult to dry successfully. Possibly the moisture content of the pomace entering the kiln was too high and in tumbling about in the kiln the material became wadded together before much drying took place. Nevertheless, pomace can be dried successfully and with relatively simple equipment.

Rotary dryer used for drying pomace. The flight conveyor extends from the basement of the frame building seen at the right in the following illustration, under and through the boiler room to the dryer



Probably the drying of pomace always will be a method of waste disposal primarily, but happily it is a method that not only disposes of a waste high in nuisance possibilities but also yields a feed product of high nutritive value, the sale of which will pay for its production if the quantity available be moderately large.

Tomato seeds have been recognized for many years as a source of edible oil. In 1907 Kochs, a German chemist, dried press residues of various sorts in sunlight, tomato pomace among others, ground the seeds,

Receiving tomatoes at the Hayward plant of the California Conserving Company. The boxes are placed on the conveyor seen between the stacks of boxes

and extracted the oil with ether in a Soxhlet extractor. He obtained a 17.3 per cent yield of an oil resembling cottonseed oil, and solidifying at —9 deg. C.

Pericle Accomazzo, in a paper published in 1910, showed that in Italy in 1909, 850,000 quintals of tomatoes was worked up which yielded 120,000-130,000 quintals of residue containing 30,000 quintals of seed. He claimed a yield of 18 per cent of an oil by pressing, or 20 per cent by extraction, which had about the same heat value as olive oil, had rather pronounced drying powers, and yielded an excellent soft soap. In 1913 a concern in southern Italy was reported to be drying tomato pomace, removing the seeds by fanning and recovering two-thirds of their oil by a pressure of 500 atmospheres.

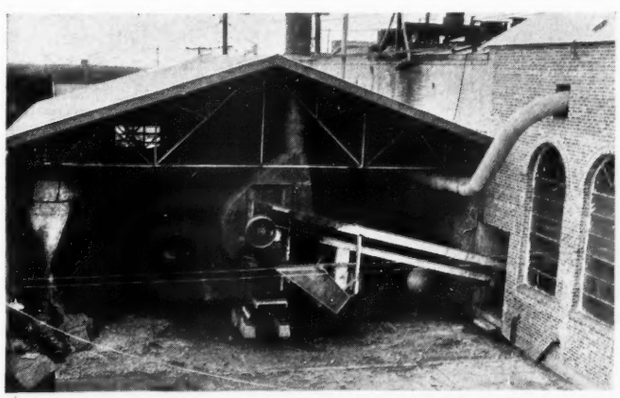
In 1917, Frank Rabak, of the Bureau of Plant Industry, made some preliminary studies on the recovery of seeds and skins from pomace and estimated that in 1918, 1,400 tons of dry seed and 1,600 tons of dry skins might be obtained from the Middle West and East.

Rabak found that by continuous extraction with ether or carbon disulphide a 22 per cent yield of crude oil could be obtained. On refining by the usual methods for vegetable oils an agreeable, nutlike, bland oil similar to cottonseed, soy bean, or sesame oil was obtained. It had a digestive coefficient of 97 and made a soft soap of good lathering qualities. Rabak considered that it should hydrogenate well, as it contained 45 per cent olein and 34.2 per cent linolein. At that time he estimated the total quantity available in the East and Middle West at 343 tons annually.

In 1921, Shrader and Rabak, in U.S.D.A. Bulletin 927, outlined a commercial method for recovering tomato seeds and for manufacturing oil from them. They showed that a modest profit might be made by a tomato-seed oil plant centrally located with respect to the large pulping plants of the East or Middle West.

The California Conserving Company, of San Francisco, was confronted with the problem of disposing of its tomato pomace a couple of years ago at its Hayward (Calif.) plant. The problem was satisfactorily solved and the method yields a product, called by the company "tomato meal," having the following proximate analysis:

	Per Cent
Crude protein (3.36 per cent nitrogen × 6.25)	21.00
Crude fat (ether extract)	17.97
Crude fiber	27.31
Ash (mineral matter)	3.72
Nitrogen free extract (carbohydrates)	24.96
Moisture	5.04
	100.00



View of the dryer showing the take-off from the smokestacks

The nutritive value of the meal is apparent from the analysis. Though the fiber content is high and carbohydrate low, the percentages of protein and fat compare more than favorably with the quantities in the grains commonly used in poultry feeding. Both protein and fat from tomato seed have been shown to have high digestive coefficients. Vitamins A and B have been shown present in tomato-seed press cake and hence are quite likely present in this meal. A ready market at $25 a ton has been found for the material among local poultry raisers, especially as feed for ducks. When scattered on ponds the seed portions sink and the skins float, making possible the underwater feeding in which ducks delight.

In making the tomato meal the tomatoes are pulped in the usual way. The seeds and skins, or pomace, drop from the battery of pulpers into the hopper of a screw press in the basement below. As the pomace enters the press it may contain upward of 80 per cent moisture; the cake from the press has 58-60. As standby equipment, beater cyclones (pulpers) also are in use, though they do not give as dry a pomace as does the screw press. The juice squeezed out by the press or from the cyclones is returned to one of the catsup lines. It is necessary to treat about 250 lb. of pomace for each ton of tomatoes entering the plant.

From press or cyclone the wet pomace drops into a flight conveyor to be carried about 150 ft. to a rotary kiln dryer. In the first installation the dryer was heated by flames from oil burners, but the present one is heated by the stack gases from a natural-gas-fired boiler in the boiler room adjacent. Normally each flight of the conveyor delivers a good sized handful of pomace into the hopper of a short section of screw conveyor which delivers it to the dryer and at the same time acts as a seal. The pomace drops into the high, cool end of the dryer and moves downward toward the hot stack gases entering the low end. At the end of this countercurrent flow the dried pomace drops into a pipe leading to a fan which blows it into the hopper of a hammer mill. The ground, dried pomace is then blown to a cyclone collector, from which 60 lb. is weighed into unlined burlap bags. A bypass from the discharge of the first fan will deliver unground material to the cyclone if desired.

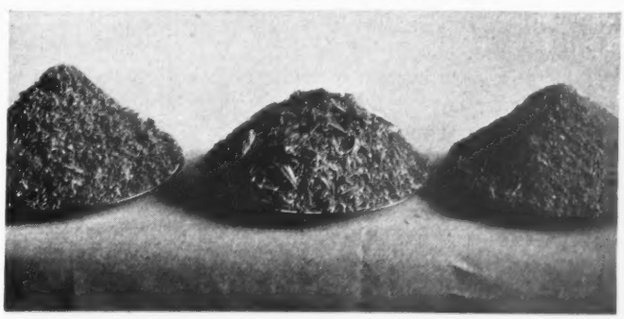
The heating gases are drawn from the stack and blown into the dryer by a fan driven by a 3-hp. motor. Temperature in the dryer is controlled by admitting some outside air to the suction side of the fan. The bulb of a recording thermometer has been placed in the hot gas pipe just before it enters the breech of the dryer. For very wet pulp, such as comes from the cyclone pulper, the temperature of the entering gas is adjusted to 400 deg. F.; for screw-press pomace, 250 deg. F. suffices. The recording thermometer and damper control chain are located near the fan and hammer mill alongside the dryer and a few feet from its breech end.

A 3-hp. motor drives the fan delivering the dry material to the hammer mill. The hammer mill, flight conveyor, dryer, and screw conveyor are driven by a 20-hp. motor connected to a countershaft and belt system.

The dry pomace before grinding is a heterogeneous material of skins and seeds, mottled red and yellow in color, very light and of a pleasant cooked tomato odor. Grinding makes the color more uniform—a sort of yellowish orange. The taste is slightly bitter, possibly from glucoside-like substances in the seed. A yield of 15 lb. of dried material is obtained from a ton of tomatoes, and the plant described normally turns out approximately 6,000 lb. of meal, or one hundred 60-lb. sacks per day.

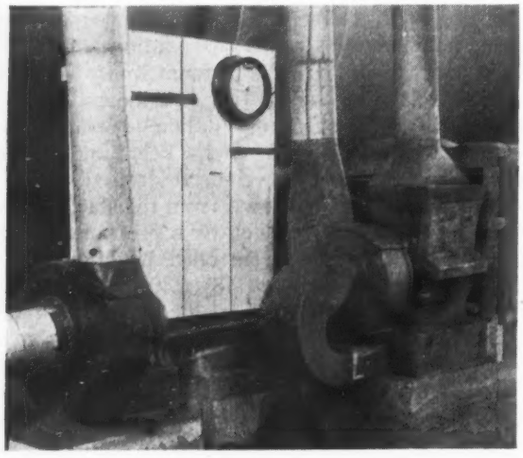
From these figures, any tomato-pulp manufacturer can readily calculate that drying pomace is not a highly lucrative business. But where disposal of tomato refuse is a problem it is a solution worthy of serious consideration. In addition to the revenue from the sale of the meal, the value of the juice recovered by pressing the wet pomace must be included. If, in addition, stack

Wet, dry, and ground dry pomace



gases or other heat, such as exhaust steam that is normally wasted, can be used for drying, it is quite possible to make the tomato wastes pay for their own disposal or even return a modest profit.

So far as is known, no one in the United States makes a practice of recovering tomato seeds for oil pressing, though seedsmen, of course, recover them for planting. In U.S.D.A. Bulletin 927, previously mentioned, Shrader and Rabak estimated in 1918 that 1,026 tons of seed could be made available from the larger pulping stations of the Middle West and East only, or 2,063 tons from all sources, on a basis of 0.5 per cent of fresh tomato being seed. Estimating a 20-per cent yield



Fan drawing the dried pomace from the dryer, recording thermometer, and hammer mill

of oil, this means 200 to 400 tons annually—hardly enough to interest a vegetable-oil manufacturer. These amounts doubtless have increased considerably since 1918, but even assuming that they have doubled, they would still be too small for anything but an oil business conducted as a side line.

Methods of Separating Seed From Pomace

To review briefly the literature on methods of seed recovery, Shrader and Rabak (Bull. 927) cited four. Seeds for planting are recovered from a long trough of slowly flowing water. The waste material flows over the end, or is skimmed off; the seed is shoveled out, centrifuged and dried. Another method is to dump the seed-containing refuse into a round tank, and then to add water through jets at the periphery so that the whole mass has a swirling motion. The seeds separate and sink to the bottom and the waste is carried over the edge of the tank. About 90 per cent of the seed is recovered.

The Italian method is to dry the pomace and remove the skins by winnowing machine or fanning mill. Shrader and Rabak proposed using a duplex pulper followed by washing the seeds in hot water in a beater cyclone and pressing in a screw press while still hot to reduce the moisture content to 50-55 per cent. The seeds were then dried on trays in a tunnel dryer or in a rotary kiln. They favored the last scheme as giving almost complete separation by a continuous process with a minimum of labor.

One way that suggests itself would be first to pulp the tomatoes in a duplex pulper, so that practically nothing but skin-free wet seeds would be handled. Next, the seeds would be run over a set of riffles with a stream of gently flowing water. The seeds will sink and the loosely adhering organic matter will float away. The third step should be some form of dewatering device such as a centrifugal dryer or possibly even as simple a scheme as heaping up on large strainers.

The use of the centrifuge was objected to by Shrader and Rabak as being a batch operation requiring additional labor. However, since the riffle washer and kiln dryer require little attention, the centrifuge operator should be able to look after the whole seed-recovery operation. With a continuous centrifuge the whole operation would become practically continuous.

This method would still leave the skins to be disposed of. By drying pomace and fanning out the seed, the skins can be recovered dry to be burned or returned to the fields as humus material. This method has been objected to as not giving complete recovery, because of skins curling around the seeds and carrying them away, but with pomace dried thoroughly it seems unlikely that losses would be serious.

Still another method might be suggested: the refuse might be macerated in a tank of warm water till it ferments. The sugars would be removed in this way and probably a good share of the gums and skins digested. The seeds could then be washed, dewatered, and dried.

The manufacture of oil from the seed is carried out according to the usual methods for seed oils: namely, by crushing, expressing in a press, and refining the crude expressed oil.

The constants of the oil may be of interest. The values given here were determined by Jamieson and Bailey from nine samples of American tomato-seed oil. They are similar to those reported for German and Italian oils.

Density—25 deg. C.	0.9184	— 0.9196
Index of refraction—25 deg C.	1.4715	— 1.4728
Iodine number	117.5	— 125
Saponification number	186.3	— 192
Reichert-Meissl number	0.1803	—
Polenske number	0.4	— 0.6
Acetyl number	10	— 20.5
Insoluble fatty acids, per cent	95	— 96.6
Soluble fatty acids, per cent	0.4	— 0.7
Unsaturated liquid fatty acids, per cent	76.1	— 80.6
Saturated solid acids, per cent	15.0	— 18
Arachidic acid	present	

Rabak (U.S.D.A. Bulletin 632) gives the following approximate composition of the oil:

	Per Cent
Olein	45
Linolein	34.2
Palmitin	12.47
Stearin	5.89
F.F.A. and M.I.U.	3.44

As was indicated above, the yield of dry seed from whole tomatoes is 0.5 per cent, from which 17 per cent of oil may be obtained by expression or 20 per cent by extraction.

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TRUCKING ECONOMY

Begins in the Plant

By F. E. SPOONER
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TRUCK transportation may be divided into two parts: external and internal. External relates to what occurs beyond the loading platform; internal to what occurs from the time an order is taken to the time the goods reach the platform. Both internal and external phases of transportation are intimately related and dependent for successful functioning upon co-ordination.

Many executives are prone to blame the external phase of trucking for extraordinary expenditures, when actually such a situation is caused by lack of proper control on the inside. This lack of control will hamper the best-conceived external transportation plans. Regardless of how fine a fleet of trucks may be used, or how well conceived may be the routing and scheduling, the best performance cannot be secured until the sales force and everyone else connected with the matter knows intimately what effect their work has on costs.

In this connection may be related the experience of a trucking specialist who was employed to discover ways and means to lower delivery costs for a medium-sized fleet. Upon investigation he discovered that on one day over 100 packages had to be returned because of incorrect addressing. In one case, a salesman had insisted on his order being delivered immediately, because he wished to receive a sales credit that month instead of the next, when it should have been delivered. As a result, the order went out C.O.D. instead of on credit, and the irate customer not only refused delivery but was lost to the concern for future business.

Another investigation covering a fairly large truck fleet revealed a condition where temptations were placed in the way of drivers so that they could pilfer small quantities of potatoes from bags in sufficient amounts to make up new bags for sale. In another case, drivers were placed in the position of pilfering food products by being forced by the man in charge of loading to sell to stores at low prices excess goods that had been purposely placed in the trucks. Such goods were never entered on the records and the profits therefrom were split between the drivers and the platform man.

Though not definitely related to the question of delivery expense, the foregoing practices are responsible for profit losses and therefore are factors in the delivery question that bear watching.

Frequently, the credit department may be responsible for abnormal delivery expense. In most cases this may be traced to the delays in shipments occasioned by a routine of credit finding that does not start functioning as soon as it should after an order has been placed. As a result, orders, for example, that have come in early Wednesday afternoon, scheduled for Thursday morning delivery, are not handled until after noon on Thursday. Such delays are responsible for rush deliveries, usually sent out at times when the trucks are fully loaded, or the other extreme, when no other deliveries are scheduled. No recognition is given the fact that to send a truck out on such rush deliveries is costly in time, in cost per package, and in breaking up delivery schedules.

Well-conceived plans for trucking schedules are built up around a policy of handling the outgoing and incoming goods in such a manner that in all possible cases the vehicles will be fully loaded, in order that the profits from each load will be more than adequate to cover the expense.

IN order that the external and internal divisions of a trucking service can be fully co-ordinated, it is essential first that this department be placed on a footing equal in importance as an economic factor to other departments of the business. For that reason, it should be on a budget, subject periodically to expert accounting analysis. In this respect, some companies have gone so far as to establish the trucking department as an independent organization, free to carry on its affairs on a profitable basis.

Placed in such a position, it is patent that those in charge will effect economies that would otherwise be overlooked as factors too dangerous to stress in view of the chance of offending some official higher up.

An independently operated department such as this could obtain the co-ordination and teamwork of the internal departments equally as well as any outside trucking concern that might come in to carry on the work. Trucking concerns usually can bring with them sufficient experience to enable quick detection of profit-taking practices. And because the elimination of such practices is a financial factor of no mean importance to them, their rates per package are dependent upon the economies that can be effected. It is necessary therefore, that they have the fullest co-operation in cutting down lost motion, waste of time, and other losses.

But before setting up an independent trucking organization, it is advisable to make sure that the man in charge is one who knows the business just as well as he does the operating and maintenance end. He must

possess characteristics that will enable him to gain departmental co-operation. In addition, he must be able to lead his drivers in such a manner that it will be possible to ingrain loyalty and obedience to rules and regulations.

Not infrequently, men in charge of trucking departments have been hindered in their work through rules of their companies that prevent them knowing at all times what their departments cost. A lack of this knowledge places such men in a position of having only meager facts for guidance. As a result, there is little challenge for effort, for without comparisons from one year's end to another, very little advancement can be made.

For example, complete costs are lacking from which to establish a "bogey" delivery price per package to aim at. Also even if costs are available, they are likely to be used by the cost control department to give a picture other than actually exists.

Complete cost analysis as well as complete control of everything should be in the hands of the trucking department head. He should have his own bookkeeper and should also have some control over purchases of vehicles and stockroom equipment.

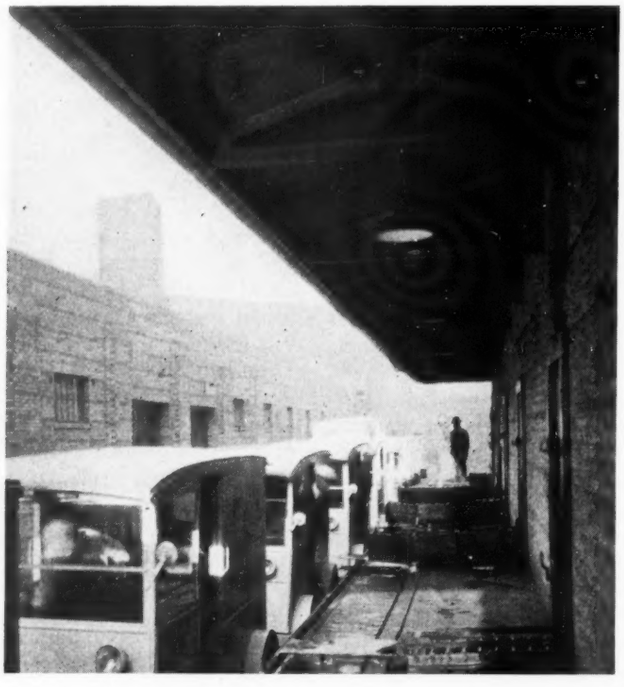
His cost-keeping should be subject annually to a survey by skilled accountants, not only for the purpose of a check but also for the purpose of giving him a chance to prove progress when it has been accomplished. In this respect, it might be stated that with complete costs on hand many a trucking head has been able to place his department in the light of being an important factor of the business rather than a necessary evil. This is especially so when costs reveal inefficient functioning of internal departments upon which the trucking department is dependent for successful operation.

In respect to vehicles and stockroom purchases, there is no better guide than a good cost-keeping system in the hands of a man who can interpret its facts accurately. He is in a better position to judge the merits or demerits of a vehicle or of stockroom equipment than executives higher up. Too frequently, certain makes of trucks are purchased through influence rather than logic. At other times, a change from one make of truck to another is made blindly as a means of lowering operating costs, or heads are chopped off the payroll. If such action is based on accurate cost analysis, then it is justified; but if the yardstick is guesswork or at the best but meager cost facts, then it is illogical to suppose that the results aimed at will be obtained.

Trucking control when centralized under an experienced head becomes the watchdog for an organization. In addition to justifying its existence as a means for placing trucking on an economical basis, it also should step in in an advisory capacity on such questions as loading or unloading devices for expediting the movement of goods on the platform and onto or off the trucks, departmental record system for checking movement of an order from the time it is placed until finally consummated, handling deliveries for special sales, expansion of sales territory in respect to the question of using company-owned or outside trucking service, or rail shipment.

These and many other matters related to the movement of goods are part of the responsibilities in trucking control. Regardless of how small a fleet of trucks is used, the word of authority must be vested in some one person capable of evaluating things in their proper light for the purpose of solving problems most economically.

Company executives in whose care are the problems of transportation or who are in any way connected with this unit of their business are beginning to realize that under the new order of things, competition has placed transportation service in an outstanding position as a factor for business supremacy. Ever-widening markets coupled with a demand from customers for quick and frequent replenishment of stocks, places truck transportation on a new footing as a business-getting possibility. Its success in coping with the difficulties commonly met with depends upon the study given to every detail, no matter how minute.



Trucks unload onto the slat conveyor extending along the platform and are loaded from the roller conveyors that feed out of the building at each truck station

Deep wrinkles on dried fruit surfaces hinder insect control

INSECT CONTROL

In Dried Fruits

By H. M. REED
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DRIED FRUITS are subject to several forms of spoilage and deterioration such as fermentation, molding, sugaring, darkening of color, and insect infestation. Of these, insect infestation causes more damage than all of the other forms of spoilage combined.

Infestation of the fruit may occur to some extent in the field, but the greater portion of it is found in the packing-house storage places and in the retail packages. Methods of control include prevention of infestation, destruction of insect life by heat or fumigation, and inactivation of insects by means of cold storage and packaging.

Considerable time and money could be saved by the packing houses if they would consider the problem of infestation as one which requires constant vigilance. But there is a tendency to become lax during years when infestation is not heavy, and usually this is the time when the most good could be done.

One of the most important principles of insect control is that of plant sanitation. Hold-over material and culls which have been stacked away in dark corners, stemmer waste from raisins, and other forms of waste which might easily accumulate around a packing house, all make ideal breeding places for dried-fruit insects. One of the first sources of infestation can be reduced to a minimum by keeping the packing house as clean as possible.

Field containers are sources of plant infestation which should be given special attention by packers. Corners and crevices of boxes often contain numerous insects in the pupal state which develop into adult insects about the time fruit is placed in them. Soon after fruit is placed in these boxes, eggs are laid on the fruit, with the result that often by the time it reaches the packing house a good case of infestation is well under way. A thorough fumigation or sterilization of the containers at the beginning of each season will remedy this.

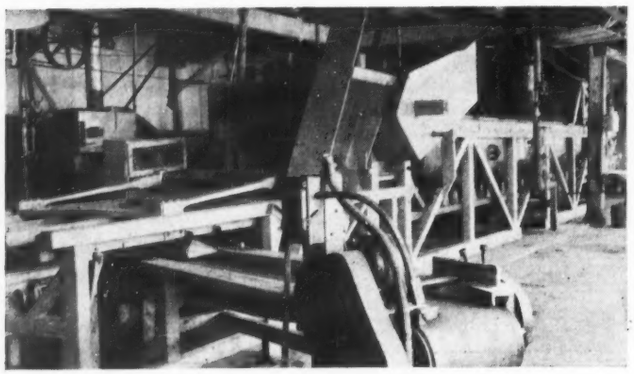
Storage bins should be kept as clean as possible and a seasonal whitewashing or painting with white paint followed by an oil spray may be of some value.

Mechanical grading of fruit and stemming of raisins, which shake and knock many insects from the fruit; processing at the temperature of boiling water, as is the practice with prunes, seeded raisins, and particularly peeled peaches; and resulphuring of cut fruits are practices in packing-house procedure which will help to prevent infestation. However, with the possible exception of processing at comparatively high temperatures, it is extremely doubtful if any of these practices will entirely eradicate insects in all their stages from the fruit, and,

even if they did destroy the insects, the problem of reinfestation is always likely.

Often box cars which have been used to carry grain are found to have many insects, especially saw-tooth grain beetles, that are known to infest dried fruit. They are found lodged in the corners of the car and in crevices in the floor. It is difficult to fumigate a box car and get a perfect kill unless the car is a tight one; however, a good fumigation should reduce the number of insects and decrease the chance for reinfestation from this source. I have found hundreds of dead saw-tooth grain beetles near the door sills of box cars which have been fumigated with HCN (prussic acid), showing that the fumigation proved to be of some value.

Because storage insects are much more active in warm weather, their rate of activity is greatly increased and their life cycle is often decreased by several months. Thus it would seem that cold storage might prove to be a valuable means of combating insect infestation. Investigators have found that exposure to a temperature of 20-25 deg. F. will kill all stages within one week, while exposure to 0-5 deg. F. will kill all stages within



Equipment for processing prunes presents problem in insect control

one day. Dried fruit has been kept at 32 deg. F. at the University of California for more than a year without any signs of infestation. Even that fruit which was infested at the time it was placed in cold storage showed no further insect growth and in fact when subsequently examined it was found that practically all of the insects were dead.

Cold storage is an ideal means also of preventing infestation in the warehouses of the wholesale and retail distributing agencies. By utilizing this idea the goods can be placed in the hands of the consumer practically, if not wholly, free from infestation.

As has been previously mentioned, heat may be utilized in the eradication of insect pests. A temperature of 124 deg. F. for two hours has been found to kill all stages of insect life. It is quite likely that freshly dehydrated fruit is free from living insects. I have observed that fig moth larvae in dehydrated figs presented a scorched and deflated appearance and were quite dead. In spite of the questions that have arisen regarding the effect of the hot-water process upon the larvae in the interior of the fruit and upon the eggs in deep wrinkles on the fruit surface, it is safe to say that practically all insect life is killed in the hot-water process.

Heat as a means of sterilization may be utilized in another way: for killing insects in rooms which can be heated to comparatively high temperatures, a practice which flour mills have used quite effectively.

Although packing in tin or glass is a good method of protecting dried fruit from insects it has the disadvantage of being comparatively costly. However, in certain special cases the advantages warrant the additional cost of packing. The fruit can be completely sterilized and there is no further possibility of infestation; also certain specialty products are best adopted to this type of container.

Considerable work is being done on the development of an insect-proof carton by various carton manufacturers and by other investigators. Different methods of folding, lining, and wrapping are being tried, and it is quite possible that a carton will soon be perfected which is absolutely impervious to penetration by insects. Wrapping is particularly promising.

Fumigation—use of a vapor or gas that is toxic to insects—is by far the most widely used method of control of dried-fruit insects. Fumigation at atmospheric pressure and under vacuum are two general methods in use. In either case a sufficient concentration of a toxic gas is maintained for a long enough period of time to kill insect life.

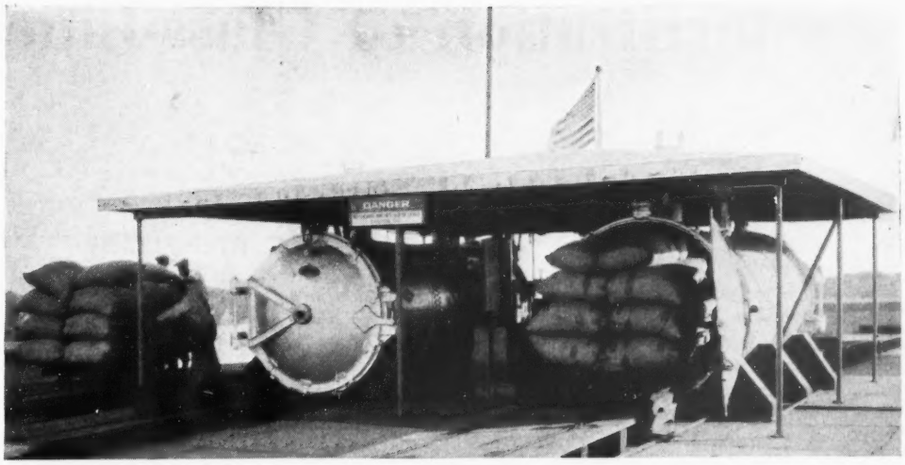
Vacuum fumigation has an advantage over atmospheric pressure fumigation. By first removing most of the air a comparatively high concentration of toxic gas can be allowed to enter the chamber, diffuse quickly and evenly throughout the load of fruit, and thus effect a kill in a very short period of time.

It has several disadvantages, however. The cost of construction and operation is greater than with atmospheric pressure fumigation and because of the relatively higher concentration of gas present it is desirable to mix with it an inert gas such as carbon dioxide or nitrogen to minimize the danger from explosion when a gas of an explosive nature is used. This is now common practice in vacuum fumigating in the California Almond Growers' Exchange plant.

Either method of fumigation is quite effective and comparatively safe when the proper precautions are taken. The particular results to be derived, and the facilities of the packer usually determine the choice.

Atmospheric pressure fumigating chambers may be constructed of wood with paper insulation, of concrete which has been painted on the inside to prevent absorption of gas, or of sheet metal. The main essential is that they be made as tight as possible. Tests made by a commercial packing house on box cars loaded with dried fruit have proved conclusively that a car cannot be used as a fumigatorium. The tests were carried out in wood cars and in metal cars lined with paper and treated with carbon bisulphide in varying quantities for 8- and 24-hour periods.

Fruit is often infested from containers during cutting operations



Vacuum fumigation at Sacramento plant of California Almond Growers' Association

Similar tests were carried out, using refrigerator cars, and it was found that if the cars were in good condition perfect kills could be obtained using 4 gal. of carbon bisulphide for 24 hours. Most of the tests on the box cars and on the refrigerator cars were made at a time when the average temperature was considerably lower than 60 deg. F., which accounts for the poor kill in a good many cases. However, since most of the fumigating is done at a time of the year when the average temperature is rather low, the tests were considered fair.

The effect of temperature is twofold, because the activity of the insect is much greater at higher temperatures and because the gas is in a higher state of molecular activity; hence more toxic to the insect. For this reason a fumigation temperature of 70–85 deg. F. is recommended. Some of the other factors that determine the efficiency of a fumigant are the concentration of the fumigant, the time of exposure, type of material fumigated, and the method of loading the fumigator. Penetration of the fumigant is much slower in goods tightly packaged than in loose bulk goods. The spacing of the boxes in the fumigator and the use of a false flooring permits better circulation and increases the efficiency of fumigation. A fan for constant circulation of air is advisable only where the nature of the fumigant is such that there is no possible danger of explosion from an electric spark.

Varying any one of these factors necessarily changes the other factors. For example, an increase in the quantity of fumigant decreases the time necessary for fumigation or permits of a lower temperature of fumigation. Increasing the time of fumigation permits of smaller quantities of fumigant or a lower temperature. By increasing the temperature, a smaller dosage can be used or a shorter time for fumigation is required. Larger dosages, or longer fumigations, or higher temperatures are required when the density of the material is increased.

Probably the most common and widely used fumigant up to the present time is carbon bisulphide. The liquid is quite volatile and its vapor is more than 2½ times heavier than air. The liquid is poured into flat shallow pans which are placed at the top of the fumigating chamber. Dosages of 4–6 lb. per 1,000 cu.ft. are recommended, although it is sometimes necessary to use as much as 8 pounds.

A good means of increasing the rate of evaporation is to suspend a piece of burlap by means of a wire or a string so that part of it dips into the pans containing the liquid. The burlap acts as a wick and evaporation is hastened considerably by the added surface area. In warm weather the fumigation can be accomplished in about 12 hours; but a longer period is advisable even at relatively high temperatures.

Carbon bisulphide has the disadvantage of being highly inflammable; nevertheless almost every accident which has been caused by its use can be traced to carelessness in handling. Caution should be used in opening up the fumigator; a mixture as low as 6 per cent by volume with air is explosive.

For some purposes hydrocyanic acid gas is a very desirable fumigant. It is highly poisonous to all forms of animal life and should not be handled by anyone who is unfamiliar with its use. It is much more toxic than some of the other fumigants but does not have their power of penetration. Hydrocyanic acid for fumigation may be obtained in several forms: namely, as a liquid compressed in cylinders, in the form of calcium cyanide powder which interacts with the moisture in the air to form HCN, and as sodium cyanide to which sulphuric acid must be added to form the gas.

Ethylene oxide is a new fumigant which seems to be quite promising. It has a low boiling point and can be used quite effectivelv at 60–75 deg. F. It has good powers of penetration and leaves no residual flavor or odor to foodstuffs which have been fumigated by it. A dosage of 2 lb. per 1,000 cu.ft. for 20 hours is recommended. Recently a mixture of one part of ethylene oxide and nine parts of carbon dioxide has appeared on the market and is recommended for dried fruits in dosages of 10 lb. per 1,000 cu.ft. for 12 hours at atmospheric conditions or 10 lb. per cubic foot for 1½ hours under vacuum.

Ethylene dichloride-carbon tetrachloride mixture has given some promise as a fumigant but it has several disadvantages. It vaporizes rather slowly, and for this reason is most effective only at comparatively high temperatures. Also the use of this mixture in the fumigation of packaged goods may not be desirable, because the odor persists for some time after the treatment.

The U. S. Department of Agriculture has tried numerous volatile organic compounds, some of which are quite promising fumigants. At present the objection to most of them is their cost, but doubtless with the development of a commercial demand for them the price could be greatly reduced.

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Sterilization of Glass-Lined Tanks*

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BECAUSE chlorine solutions usually are corrosive, study of the chemical sterilization of glass surfaces should include some data of their effect on the surface treated as well as consideration of the germicidal power of such solutions. For this reason a study on corrosion was undertaken with dishes lined with a dark blue enamel, such as is commonly found on dairy equipment.

The chlorine solutions used for this work were of two kinds. One, prepared by dissolving in water a calcium hypochlorite containing 65 per cent available chlorine, when mixed with the required quantity of light soda ash and diluted to 340 p.p.m., gave a sodium hypochlorite solution with pH of approximately 9.5. The other was simply a chlorine water solution prepared by passing chlorine gas into water. Since chlorine gas absorbed in water forms hypochlorous acid and some hydrochloric acid the reaction of this solution naturally was acid. Facilities for determining its exact pH were not available.

The dishes were shallow and broad, 3 in. in diameter and ¾ in. deep; consequently they exposed a large surface of the solution. Although this exposure increased the loss of chlorine, the effect was partly overcome by frequent renewal of the solution. At the beginning of the experiment the dishes were dried and weighed and then filled with a fresh chlorine solution twice in each 24 hours during the length of the run. In the case of the sodium hypochlorite the run had a duration of ten days; of the chlorine water, nine days.

The series consisted of a plain water control and a sodium hypochlorite solution of 50, 100, 200, and 300 p.p.m. The p.p.m. of available chlorine was determined in all of the solutions in this work by the titration and also in some cases, as in the plant experiments, by the colorimetric methods. The treatment with the alkaline hypochlorite of pH 9.5 produced no loss in weight in the containers after 240 hours' exposure. The acid treatment showed a very slight attack on the glass after 210 hours. The figures in the following table give the loss per dish and the estimated loss per square foot per hour of exposure.

This loss is insignificant and shows that the enameled or glass-lined surfaces are very resistant to chlorine solutions as ordinarily used for sterilizing equipment in milk plants.

To answer the question occasionally raised regarding the relative efficiency of alkaline and acid chlorine solutions, a few tests have been included to obtain data on this subject. The laboratory work is indicative only of practical results, which will vary according to many possible conditions that may exist.

The organisms used for these tests were obtained by taking three half-pint cream bottles, which had been washed, rinsed, and immediately capped to prevent subsequent contamination; rinsing them with 10 cc. of sterile, neutral, standard broth; and adding 1 cc. of this broth to a tube of sterile standard broth. These tubes were incubated 48 hours at 37 deg. C. A loopful of the culture was streaked on 3 per cent agar slants. The latter were incubated 48 hours, sealed, and placed in the refrigerator. For each test a fresh streak was made from these slants, incubated 24 hours, and then washed with 5 cc. of sterile tap water; 1 cc. of this suspension was added to 50 cc. of sterile tap water to make the final suspension used in the test. When the test was started, 1 cc. of this latter suspension was used as the inoculum for 99 cc. of sterile tap water to form a check for the series, or to 99 cc. of each of the chlorine solutions of the different strengths.

At the end of the successive exposure times 1 cc. of the chlorine solution was rapidly withdrawn and run into 99 cc. of sterile water containing sufficient sterile N/10 thiosulphate solution to fix the available chlorine and also into 99 cc. of plain sterile water. The time of exposure for the organisms, where the 1 cc. of chlorine solution containing them was run into plain sterile water, would be slightly longer, but the concentration of chlorine would be immediately reduced by dilution and then, on plating, fixed by the organic matter in the agar. The results were as shown in Table II.

A count of 100 or 200 in this table means that there were 1 or 2 colonies on the Petri dish.

The titratable alkalinity of these solutions expressed as equivalent to N/1 boric acid per 100 cc. was 0.23 cc. for 50 p.p.m., 0.48 cc. for 100 p.p.m., 0.7 cc. for 200 p.p.m., and 0.8 cc. for 250 p.p.m. While the alkalinity, as shown by both the pH and the titration results, is sufficiently high for a solution of this kind it is evident that the germicidal action has been very satisfactory. The results obtained with the acid solutions, (chlorine water), were practically the same as those given in Table II.

The acidity of these acid solutions was determined by adding a measured quantity of N/10 NaOH, titrating back with N/10 HCl, and converting the results to equivalents in N/1 boric acid for 100 cc. of the solution to make the differences more marked. They were: 0.88 cc. for 50 p.p.m., 0.88 cc. for 100 p.p.m., 4.12 cc. for 200 p.p.m., and 8.53 cc. for 250 p.p.m. It is evident that the acid solutions have a relatively strong acid reaction and should on this account have a much greater germicidal effect. They do not show this, however, because in these tests relatively strong solutions were employed just as they are in spraying. Weaker acid chlorine solutions no doubt would have been just as effective, but this phase was not investigated, because these acid solutions are especially corrosive on the metal in other parts of the equipment. The convenience of either preparing or buying the alkaline solution along with its safety and relative stability compared with the handling of chlorine gas are additional features for the preference of the former.

To test the practical application of chemical sterilization of glass-lined surfaces, an alkaline chlorine solution containing 225 p.p.m. of available chlorine was sprayed on the surface of a vertical welded glass-lined milk storage tank of

Table I—Loss in Weight of Glass Surfaces Exposed to Chlorine Water

	Plain Water	50 p.p.m.*	100 p.p.m.*	200 p.p.m.*	300 p.p.m.*
Loss per dish, gm.	0.0000	0.0000	0.0010	0.0013	0.0015
Loss per sq. ft. per hour	0.0000	0.0000	0.000043	0.000057	0.000066

*Parts per million of available chlorine.

Table II—Germicidal Value of Alkaline Chlorine Solutions

Time Minutes	Control	50 p.p.m Chlorine		100 p.p.m Chlorine		200 p.p.m Chlorine		250 p.p.m Chlorine	
		TS	Water	TS	Water	TS	Water	TS	Water
½	252,000	200	0	0	0	0	100	0	0
1	210,000	100	0	0	0	0	0	0	0
3	210,000	0	0	0	0	0	0	0	0
5	264,000	0	100	0	0	0	0	0	0
30	192,000	0	0	0	0	0	0	0	0

TS = Thiosulphate Solution

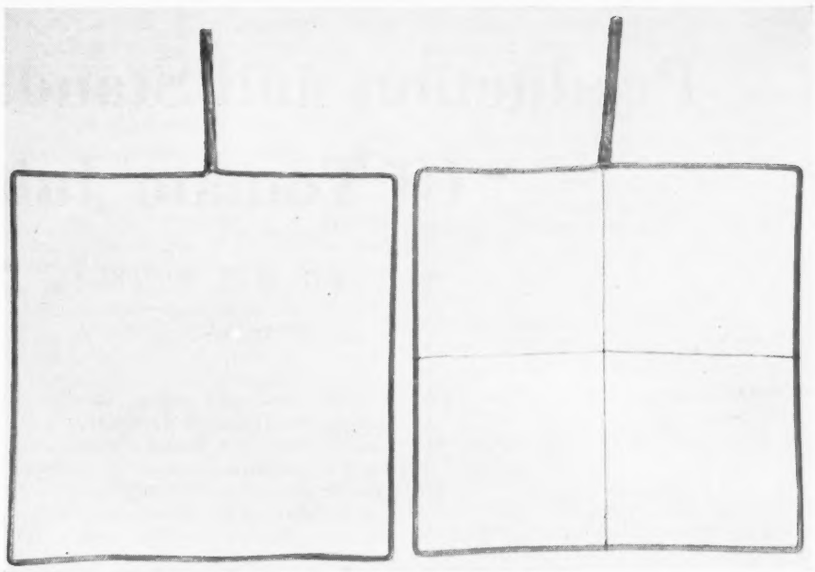
*From a paper read before the International Association of Milk Dealers, Cleveland, Ohio, Oct. 21, 1930.

3,000 gal. capacity. This tank had a manhole on the top and an agitator on the side near the bottom. The nozzle of the sprayer was adjusted so that it delivered a mist on the glass, thus promoting the formation of a uniform film over the entire surface at which it was directed. Some preliminary work showed that the time required to spray completely the whole surface to produce such a film was 12 minutes. This minimum time has therefore been used in obtaining the results reported here. The solution of cleaning powder used for scrubbing these tanks has a pH of 10 or over. In order to show a complete picture of the progressive removal of bacteria in a tank from which the milk has been drained, samples were taken from the milky surface, from the scrubbed and rinsed surface, and finally from the chlorinated surface.

As the distribution of bacteria over the glass surface would not be the same throughout the tank, three different strips were selected for sampling in each of the three different conditions of the surface; that is, when the surface was milky, after being scrubbed and rinsed, and following chlorination. These strips ran from top to bottom of the tank and are designated as strip I, II, III, etc., for each set of samples from the surface while in the different conditions. Care was taken not to have any of the strips overlap, so that no area would be swabbed more than once in any stage of the sampling. The areas, however, for the samples from the milky, cleaned, and chlorinated stages were taken as close together as possible, in the hope that the original surface contamination would be nearly the same and thus give a better picture of the progressive decrease in number of bacteria on it.

The tanks were first swabbed for the sample from the milky surface shortly after the milk was drawn out. The scrubbing and rinsing operation immediately followed this. The man who performed this work was allowed to do it in the usual time, so that this part of the operation as well as the chlorination represents the plant practice.

In sampling, the surface was carefully wiped with a sterile swab and, in order to make the report as accurate as possible, the area of the surface swabbed was controlled by means of a sterile, rigid iron wire frame with a handle. There was an opening 1 ft. square within the frame and this area was further divided by wires into four squares 6 in. on a side. These smaller squares were used as the limits for swabbing the milky surfaces and the scrubbed and rinsed ones, since in this condition they naturally would give high counts. The swabs were then dropped into sterile peptone broth and shaken.



Boundaries of swabbed areas controlled by rigid iron wire frame and carefully spaced cross-wires

In each strip the top area swabbed was just under where the surface of the milk had been, the middle area about half way down, and the bottom area about 1 ft. from the bottom of the tank. The average counts are reported as number of bacteria per square foot and are given for two complete sets of samplings.

The counts from the milky surface are interesting in that they show variation. Some of this difference is believed to be due to the proximity of the area sampled to the agitator in the tank. As the milk drains from the tank, the greatest accumulation of froth is found on the glass surface above and around the agitator. This froth, representing a greater accumulation of milk and cream, naturally gave a higher count. In selecting strips for sampling areas, no endeavor was made to obtain those likely to give a uniform count but rather variety was sought in the hope that some of the highest count areas would be sampled. Again, after scrubbing and rinsing, there is still a great variation in the bacterial content; this was found to vary all the way from 40 to 86,000 per square feet. The strips from which these samples were taken appeared equally clean.

In making the counts after chlorination it seemed better to introduce sampling on a time basis. Consequently areas from the different strips were swabbed after approximately 5, 10, and 20 minutes. The swabbing of the individual squares required from 20 to 35 seconds. Accordingly, there would be an increase in time of from 1 minute to 1½ minutes from the sampling of the top to the sampling of the bottom area in a strip. This difficulty was met by taking the sample from the top area in 4½ minutes, from the middle area in 5 minutes, and from the bottom in 5½ minutes.

The value of the practical application of the spray treatment to such surfaces is apparent even after 5 minutes' exposure. In this time the bacterial content showed a marked reduction from previous counts. The areas do not show a progressive decrease after 10 minutes. It must be borne in mind that there is a large experimental error due to difficulties in sampling and also in obtaining a uniform distribution of organisms from the swabs.

The effectiveness of the chlorine spray is evident from the counts obtained after 20 minutes' exposure, for they range from 60 to 0 bacteria per square foot in the area swabbed. Any longer exposure to the chlorine solution would still further lower some of these counts.

These results indicate that a glass-lined tank, which has been properly cleaned and rinsed and then sprayed with chlorine solution of from 225 to 250 p.p.m. of available chlorine in an alkaline hypochlorite solution, will be either in a sterile condition or nearly so half an hour after being sprayed.

Table III—Germicidal Value of Acid Chlorine Solutions (Chlorine Water)

Time Minutes	Control	50 p.p.m Chlorine TS	50 p.p.m Chlorine Water	100 p.p.m Chlorine TS	100 p.p.m Chlorine Water	200 p.p.m Chlorine TS	200 p.p.m Chlorine Water	250 p.p.m Chlorine TS	250 p.p.m Chlorine Water
½	396,000	0	300	0	0	0	0	0	0
1	405,000	0	0	0	0	0	0	0	0
3	450,000	0	0	0	0	0	0	0	0
5	459,000	0	0	0	100	0	0	0	0
30	513,000	0	0	0	0	0	0	100	0

Table IV—Effectiveness of Chlorination Treatment

		Milky Surface			After Scrubbing and Rinsing			After Chlorination		
	Strip	I	II	III	IV	V	VI	VII 5 min.	VIII 10 min.	IX 20 min.
First Set of Samplings	Top Area	22,500	3,300,000	180,000	17,500	6,600	86,000	80	255	15
	Middle Area	40,000	1,600,000	75,000	9,500	8,100	25,500	50	300	30
	Bottom Area	180,000	310,000	140,000	40,500	16,500	21,000	60	25	15
Second Set of Samplings	Top Area	150,000	2,600,000	184,000	9,000	27,000	320	750	80	30
	Middle Area	230,000	3,500,000	180,000	17,500	7,700	200	...	120	0
	Botton Area	270,000	800,000	128,000	16,000	5,300	40	40	90	60

Production and Standardization Of Tomato Juice*

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THE American public is rapidly becoming tomato juice conscious. It is conscious of a new, delightful, and refreshing drink that is both a food and a snappy appetizer. When purchasing this product, the public rightfully demands a product that is dependably uniform—uniform in flavor, uniform in color, and uniform in texture and consistency. These demands are not unreasonable and can be complied with by any careful manufacturer.

This relatively new product holds great possibilities for the tomato canner and its future rests in the hands of those manufacturing it. It will not be a passing fad unless the consumer is disappointed in his purchase.

The packer who insists on producing an inferior product, such as that made from diluted pulp, peeling table drainings, or from unsound or improperly ripened and prepared tomatoes is jeopardizing the future of the entire industry.

Do not kill this new product by such methods of manufacture or for the lack of knowledge as to the correct methods of its preparation.

A survey of manufacturing methods together with the results of several years of somewhat extensive research work has fully demonstrated the controllable factors influencing the quality of tomato juice. Some of these factors which will be subsequently discussed are as follows:

1. Original condition of the fruit.
2. Sorting, washing and trimming operation.
3. Method of extraction.
4. Viscolization or homogenization.
5. Closing Temperature.
6. Process.
7. Cooling.
8. Equipment materials.

Original Condition of Fruit

Tomato juice is not an outlet for second quality or otherwise unsuitable fruit. As with any manufactured article, the quality of the finished product is a direct reflection of the raw material. The quality of the unfinished product is proportional to the quality of the tomatoes used.

Experimental work has admirably and conclusively shown that the use of only a very small percentage of unsound (moldy, dry-rot, or over-ripe fruit) definitely lowers the flavor quality. The flavor of tomato juice is an extremely delicate and easily destructible property. Foreign flavors are absorbed almost incredibly. In this property, tomato juice resembles milk, a product having absorbing qualities with which we are all familiar.

In the manufacture of tomato juice, only choice tomatoes at the proper stage of maturity should be used, and these should be handled immediately on receipt from the field.

The degree of ripeness plays an important rôle in the ultimate juice flavor. Experiments conducted with fruit of three different degrees of vine ripeness showed that juice prepared from dead ripe, unspoiled, wholesome fruit was somewhat flat to taste and lacking the required tartness necessary to give the product its proper zest. Juice from firm U. S. Grade No. 1 tomatoes was of excellent quality while that from slightly green tomatoes, though at first preferred by some because of its higher acid content, was undesirable after a period of several months' storage, because of the development of a bitter flavor. The pH from these three lots of juice showed no consistent differences. Viscolized juice did not separate at all, but the unviscolized juice separated least in that from the extra ripe, yet sound fruit.

The juice from vine-ripe tomatoes in every instance gave a much superior product to that obtained from tomatoes ripened in storage. Addition of a small percentage of moldy and bruised fruit produced a juice having a characteristic moldy flavor, the strength of which was directly proportional to the quantity added.

Sorting, Washing, and Trimming

Sufficient emphasis can scarcely be placed on sorting, washing, and trimming. Primarily, their purpose is to remove material which will injure and mask the delicate tomato flavor. Sorting will remove fruit of improper maturity. Washing will remove dirt and grit, together with mold and decayed material adhering to the surface of the tomatoes and resulting from contact with bruised or unwholesome fruit. Trimming and coring will remove green and bitter portions.

The method of juice extraction, other things being equal, will practically govern the vitamin content of the product. Kohman, Eddy, and Zall, in their article entitled "Vitamin in Canned Foods, IX, Tomatoes," which was published in *Industrial and Engineering Chemistry*, Vol. 22, p. 10-15, September, 1930, pointed out:

"The vitamin A content of tomatoes is practically unaffected by the commercial process to which tomatoes and tomato products are commonly subjected. It is removed with the pulp by filtering.

"The vitamin B content of tomatoes is apparently somewhat affected by certain processes where excessive exposure to oxygen is not avoided.

"Vitamin C in tomatoes is apparently quite stable to heat if oxidation is avoided. Concentration to two-fifths of volume by open-kettle boiling or to one-fifth of volume in vacuum requiring continuous long heating, shows no evidence of vitamin C destruction. Any preliminary process that introduces air, however, will result in destruction of vitamin C in proportion to its exposure and the temperature to which the product is subsequently heated."

One of the most desirable features of tomato juice is its vitamin C content, and this has been proved to be greatly affected by the introduction of the oxygen of the air. The air is introduced into the product largely at the point of juice extraction. Other places of introduction are pumps (particularly rotary type) operating without a continuous head of juice on the suction side thereof, and from open pipe lines which allow the juice to fall through the air into a subsequent container or receptacle.

Our experimental work has shown that any equipment which provides a continuous-pressure method of juice extraction and which eliminates splashing and dispersing air into the juice, will be satisfactory for this operation. The use of any ordinary type of tomato cyclone or pulper is particularly inadvisable for extracting juice from cold tomatoes, not only from the standpoint of vitamin destruction but because of color and flavor destruction, and added separation difficulties.

The use of the cyclone on hot tomatoes does not produce the same deleterious effect that it does with cold tomatoes. This is because the air has been displaced from within and about the cyclone by the vapors of juice. It

*Address given before the Tomato and Tomato Products Section of the National Canners' Convention, Tuesday, Jan. 20, 1931.

should be emphasized here again that when hot extraction is employed the subsequent operations necessarily must take place in a minimum time.

Where excessive quantities of air have been introduced, the control of either headspace or separation is practically impossible. The air within slowly rises to the top of the container and passes into the headspace, thus increasing the amount. The headspace will then depend somewhat on the amount of entrapped or occluded air.

Increased viscolizing pressures will not prevent separation in tomato juice that contains considerable quantities of air. Separation resulting from the inclusion of air differs from the ordinary type of separation in that the pulp material is carried to the top of the container rather than settling down. Viscolizing an aerated product results in a minute division of the air particles similar to the effect on pulp particles. These in turn attach themselves to particles of pulp, giving them greater buoyancy and thereby effecting an upward pulp movement, which results in separation. Occluded air within the product is a great source of trouble to the tomato juice packer.

Viscolization

Viscolization or homogenization effects uniformity of texture and with a properly prepared juice prevents separation. The pressure used for this operation should be sufficient to prevent separation and to produce the texture desired.

The flavor differences which have been noted by some are, I believe, really a texture difference. A similar comparison is that of ice cream made from two lots of the same ice cream mix; one having been homogenized, the other unhomogenized. The apparent flavor differences which are seemingly detected have been attributed to texture differences instead.

The Closing Temperature

We have found low closing temperatures and consequently low can-vacuum largely responsible for quality changes noted in the product after closure. Where a uniformly high closing temperature is not maintained there is a loss of both flavor and color. Flavor losses here may be serious.

The vacuum pack method, because of the elimination of air, will undoubtedly become distinctly advantageous in canning of this product.

No additional process after filling is necessary where a closing temperature of 180 deg. F., or above, is maintained. Cans closed at this temperature, when inverted and held for 3 minutes, may then be water-cooled.

Process

The use of an additional process is necessary only where low closing temperatures have been employed. The time of process here depends upon the initial closing temperature itself.

Cooling

Water-cooling immediately after the process or after closure where the closing temperature is sufficient to effect sterilization is advisable, as it minimizes the heat effect on the juice and results in a better preservation of the original color and flavor.

Equipment and Materials of Construction

Equipment—that is, all machinery, pipe line, tanks, trimming knives, etc.—whose surfaces come in contact with the tomato juice should be constructed of non-corrosive metals or alloys, or enameled, glazed, or heavily tinned surfaces. Copper, brass, bronze, galvanized, and iron equipment are very injurious to both color and flavor.

Equipment constructed of a non-corrosive metal or alloy affords the greatest permanent protection, as it is not subject to abrasions and chipping, thereby exposing the base metal.

Corrosion tests are now under way at our laboratory which, when completed, will show the relative resistance of a great many materials used in equipment manufacture. Results of these experiments will be available within the next month.

Dirty, unclean equipment is an abominable condition that is inexcusable. Water flushing will not cleanse equipment, especially pipe lines. The entire equipment must be so designed that it may be disassembled and scrubbed after each day's pack in the same manner as in dairies.

Here is one example of an unsanitary condition which was responsible for an unmerchantable product. A packer stated his product had a very musty and almost indescribable foreign flavor and asked our assistance. In this factory both tomato pulp and tomato juice were packed, though not at the same time. On completing the day's pack of either product, the equipment and pipe lines were flushed out under heavy water pressure and then permitted to stand until the next day, when they were again flushed as before. This method of cleaning permitted an accumulation of tomato fiber on the rough etched walls of the equipment. On standing, this fiber decayed, molded, and became a continual source of filthy contamination which destroyed the flavor and merchantability of the product. After a thorough cleaning, no further difficulties were experienced in this factory.

Ideal Factory

An ideal factory for the production of this product would be one in which the equipment was constructed of proper materials and located in a well-lighted building, the walls and floors of which would always be kept well cleaned and drained. The equipment would provide for adequate washing, sorting, and trimming of the tomatoes before juice extraction.

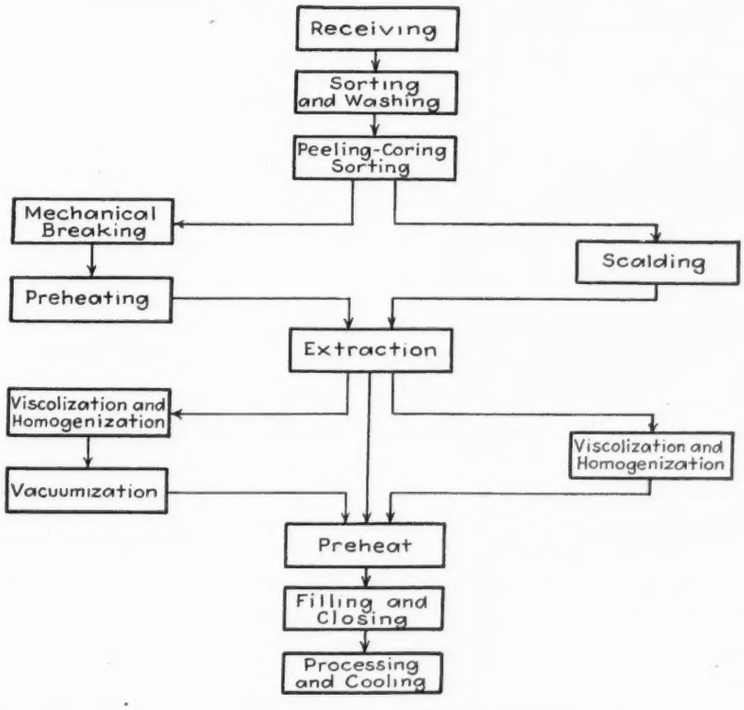
Sufficient manufacturing capacity should be provided so as to make it unnecessary for either tomatoes or tomato juice to be held.

Great care should be exercised in the selection and installation of the equipment so that metallic contamination and air occlusion are reduced to a minimum.

It would be extremely difficult to produce a product with uniform texture and to eliminate separation without viscolizing or homogenizing equipment.

In closing, may I admonish you to use only first quality tomatoes, handle them rapidly, and, to maintain sanitary conditions, avoid the introduction of foreign flavors. And finally, do not kill this new product.

Flow sheet for the process of preparing and canning tomato juice



ABSTRACTS OF CURRENT LITERATURE

BAKERY ODORS. P. G. Pirrie, *Bakers' Weekly*, Vol. 68, p. 49; Nov. 29, 1930.

Volatile ingredients of certain products may be absorbed by other baked goods and result in undesirable odors. Repeated heating to which the oils and greases used in the bakery are subjected gives rise to another type of bakery odor which is largely overcome by thorough cleaning of the pans each time they are used. In certain shop conditions it is desirable to place the ovens in separate rooms so that vapors given off are not absorbed by other products more susceptible to contamination.

* * *

COCOA BUTTER. H. P. Kaufmann, *Chemische Umschau auf dem Gebiete der Fette, Oele, Wachse, und Harze*, Vol. 37, pp. 305-11; Nov. 12, 1930.

There is still active controversy as to the relative merits of the press and extraction processes for making cocoa butter. Most of it relates to the technical and cost factors involved, but with respect to the most important use of cocoa butter—namely, as an edible fat—the nutrition experts also deserve a hearing. Cocoa butter made by the two processes shows practically no difference in calorific value, but differences do occur in the accessory food factors; namely, in the lipochromes and in the components which impart flavor and aroma to the fat. On the basis of accessory food factors, extracted cocoa butter cannot compete with the pressed fat in the present status of the processes. The superiority of the pressed fat is especially pronounced with respect to aroma. The extracted fat is commonly made from the hulls, although the beans are sometimes used for extraction if damaged and not suitable for pressing. This increases the deficiency in aroma of the extracted fat; but even if made from whole, sound beans, the extracted fat would still be inferior.

* * *

BENZOIC ACID PRESERVATIVE. J. J. J. Dingemans. *Chemisch Weekblad*, Vol. 27, p. 640; Nov. 22, 1930.

In the Mohler test, prescribed by the pure food regulations of some countries for detection of benzoic acid preservatives, benzoic acid is nitrated to m-dinitrobenzoic acid, which forms a yellow ammonium salt. Addition of ammonium sulphide gives a characteristic color change from yellow to reddish brown. For some foods the test is satisfactory, but experiments have proved that it is unreliable when applied to jams, fruit juices, and margarine. A more sensitive and dependable test consists in extracting the acidified sample with ether, dividing the extract in two portions and evaporating off the ether. One portion is tested with ferric chloride for salicylic acid; if this is present it must be destroyed by oxidation with permanganate before completing the test. If salicylic acid is absent, the other portion is heated in a water bath with sulphuric acid and potassium nitrate, cooled, made alkaline with ammonia, and tested with hydroxylamine hydrochloride (2 per cent solution). A garnet red color indicates presence of benzoic acid.

* * *

CORAL PEA. J. Pieraerts, E. Castagne and L. Adriaens. *Matieres Grasses*, Vol. 22, pp. 9032-4; December, 1930.

An investigation of the composition and properties of the coral pea, a seed of a leguminous tree of the Belgian Congo, shows that it contains no alkaloids and no tannins, and that the fat derived from it is potentially one of the best and cheapest sources of palmitic and stearic acids. These acids are obtainable from the coral pea fat on account of its extremely high content of lignoceric acid; in this respect the fat far surpasses all other known natural products. The chemical laboratory of the Service Chimique du Congo Belge has worked out a procedure by which stearic or palmitic acid can be easily and cheaply made from the fat without the necessity of alcoholysis and without vacuum fractionation. Coral pea oil has the property of solidifying quickly and completely, even in tropical weather.

* * *

ANIMAL WASTES. Bruno Hassel. *Seifensieder-Zeitung*, Vol. 57, pp. 837-9, 854-5; Nov. 27 and Dec. 4, 1930.

Establishments for working up slaughter-house wastes and other animal products experience much difficulty in maintaining profitable operation, in view of the seasonal fluctuations in their source of supply. Under the old methods of boiling and rendering, it was difficult or impossible to equip a plant with apparatus which could be adapted to other material during slack times in slaughter-house supply. With the newer extraction methods, however, apparatus can be designed for use with a variety of materials. Chief among these are garbage (hotel, restaurant, and household), fish offal or wastes, butchers' scraps, cracklings, and the like. Actual figures, taken from American practice, are given for the capital investment and operating costs for a plant with a capacity of 15 tons of cracklings per day.

RANCIDITY IN FATS. Kurt Täufel and Josef Müller. *Zeitschrift für angewandte Chemie*, Vol. 43, pp. 1108-12; Dec. 20, 1930.

In the numerous investigations which have been made of rancidity and its causes, experimental results agree to the extent of showing that the initial reaction is autoxidation, and that this reaction is quite sensitive to catalysis, both positive and negative. But there is considerable conflicting evidence with respect to the action of specific catalysts, so that a systematic study of oxygenic and anti-oxygenic catalysis seemed desirable. Autoxidation experiments were therefore made with oleic acid and ethyl oleate, as the simplest analogs of those unsaturated components of natural fats which are responsible for rancidity. Phenol, which has been reported to be anti-oxygenic, was found to be faintly oxygenic. Salicylic acid and its iron salts are distinctly oxygenic; beta-naphthol is almost inert. Copper acetate, contrary to expectations, is a strong anti-oridant with respect to ethyl oleate; so is hydroquinone, as it should be, in accord with past experience.

* * *

SUGAR OR HONEY IN BREAD. W. F. Geddes and C. A. Winkler. *Canadian Journal of Research*, Vol. 3, pp. 543-59; December, 1930.

The associate committee on grain research of the National Research Council of Canada has carried out an investigation at the University of Manitoba to ascertain the degree of validity of the common belief that honey is better than sugar in bread making, giving better flavor and keeping qualities and a higher fermentation rate. Comparative baking tests with sucrose as customarily used and with honey to give like sugar content reveal no significant difference in loaf volume, flavor, or other bread characteristics. Further comparisons of rate of gas production, and of sugar content at the end of the proof period, also failed to show any noteworthy difference. The real field for honey in the baking industry lies rather in sweet goods, where its flavor, higher sweetening power, and greater hygroscopicity are particularly favorable as compared with sucrose.

* * *

PALMITIC AND STEARIC ACIDS. Hugo Dubovitz. *Chemiker-Zeitung*, Vol. 54, p. 814; Oct. 18, 1930.

It is now possible to produce refined or technical grades of palmitic and stearic acids, in tank-car lots if necessary, at much less than prevailing market prices. The preferred raw material for making palmitic acid is Chinese tallow, which may be saponified in an autoclave or with a Twitchell reagent. The crude acid is cold-pressed to remove liquid oleic acid, melted, cast in cakes, and hot-pressed. The product contains 98 per cent palmitic and 2 per cent oleic acid. It can be still further

refined if required. For making stearic acid, shea butter is a suitable source; or olive oil can be hydrogenated to convert its oleic acid to stearic acid. In the latter case, the hydrogenation should not be carried too far; the initial iodine number of the fatty acid, about 89 or 90, should be decreased only to about 35 or 40. This is because the hydrogenation, if too vigorous or prolonged, is complicated by formation of lactones, anhydrides, and the like. After the hydrogenation has been carried to the proper point, the material is treated as described in the manufacture of palmitic acid from Chinese tallow.

* * *

NUTRITIONAL VALUE OF RAW FOOD. A. Loeury and W. Behrens. *Klin. Wochschr.*, Vol. 9, pp. 390-3, 1930; *C. A.* Vol. 24, p. 4081, 1930.

A raw-food diet does not suffice for bodily needs. The caloric value of the amounts taken voluntarily is low, averaging around 1,500-1,600; of this only a relatively small proportion is actually utilized. The fecal matter increases about threefold, and its caloric value is much higher than that of the normal stool. The actual number of calories utilized by seven people on the diet ranged from 1,000 to 1,300. The protein metabolism on such a diet is on a dangerously low level.

* * *

YEAST GROWTH. Niels Nielsen. *Zentralblatt für Bakteriologie*, Vol. 82, pp. 70-1; Nov. 20, 1930.

It has been found that rhizopin, a substance formed by the fungus *Rhizopus suinus*, greatly accelerates the growth of yeast. The effect is manifested both in greater formation of yeast dry matter and in increased conversion of carbohydrates to alcohol. A convenient method for making rhizopin is to cultivate the fungus for 6 days at 35 deg. C. in a liquid glucose-ammonium tartrate nutrient medium. The liquid is then filtered and sterilized in an autoclave; the resulting solution contains rhizopin. It may be used as such for accelerating yeast growth and fermentation, or it may be purified by precipitation with 10 times its volume of alcohol.

* * *

COATING FERMENTATION VATS. *Farbe und Lack*, 1930, p. 472; Oct. 1.

This is a review of *Deutsch-amerikanisches Brauerzirkular No. 1*, 1930, relating to the problem of satisfactory and durable coatings for the inside of vats and tanks used in the fermentation industries. Use of enamel ware or tinned ware is preferable in some cases; but for those uses for which a coating of the varnish type is indicated, shellac is generally preferred both in Germany and America. Wax coatings, applied hot, are sometimes chosen instead of shellac, but they are less durable. The service life of a shellac coating may be somewhat more or less than two years. When a new coating is to be applied, both the accumulated scale and the old shellac must first be thoroughly removed. Portable electric heaters may then be used to accelerate the drying of the surface, especially if it is wood. A first coat of thinned shellac is then applied to the cover, then the side walls, and finally to the bottom, applying the heat of the lamp whenever a couple of square yards of surface have been coated. After about 24 hours this is smoothed with emery paper and the final coat of heavy shellac is applied.

* * *

OLIVE OIL EXTRACTION. H. B., *Matières Grasses*, Vol. 22, pp. 8980-1; October, 1930.

Italian experiments, undertaken with a view to improving oil extraction so as to obtain the highest grade oil at minimum cost, have brought out methods which are quite different in principle from the oil-press method. One is a chemical method, in which the ground pulp, warmed by a steam coil to 30 deg. or 40 deg. C., is treated with dilute alkali and agitated by a compressed-air jet, while an electric current is passed through the mass. The yield by this method is slightly less than from a press, and the oil has a woody flavor and a slight tendency to turn rancid. These drawbacks make it less desirable than the press. A diffusion method has been worked out which gives a high-grade oil, but the yield is slightly low and the installation cost is high. Centrifugal extraction, in the present state of the art, is ruled out by low yield, high cost of apparatus, and difficulty of cleaning the centrifuge baskets. A vacuum extraction method also was tried, but did not get beyond the experimental stage.

* * *

PECTIN FROM LEMONS. Beniamino Melis. *Giornale di chimica industriale ed applicata*, Vol. 12, pp. 353-4; July, 1930.

The Melis plan for utilization of lemon residues contemplates the greatest practical recovery of all useful byproducts. This is in contrast to the Romeo-Sciacca plan, which limits the treatment of lemon wastes to the recovery of pectin. Charts are presented showing the processes involved in the two plans. The Melis plan starts with lemon paste, which is dried, powdered, and extracted with alcohol. After recovery of the alcohol, the extract is taken up in water, concentrated, and treated with carbon bisulphide for separate recovery of fats and proteins. The carbon bisulphide also is recovered. The pecto-cellulose residue from the alcohol extraction is treated with chlorine for separation of pure cellulose, and the pectin fraction is treated with aluminum chloride or ferric chloride for pectin recovery. The Romeo-Sciacca plan starts with fresh lemon peel, which is macerated, washed with water, treated with 0.1 per cent HCl, and separated into a cellulosic paste and a pectin fraction. The latter is filtered with kieselguhr (if necessary), subjected to vacuum evaporation, and the pectin is precipitated with alcohol. In this plan, the alcohol is recovered; and the wash water from the macerated peel can be worked up for sugar and citric acid if conditions warrant.

* * *

THE EFFECT OF DRYING AND OF SULPHUR DIOXIDE UPON THE VITAMIN A CONTENT OF FRUITS. Agnes F. Morgan and Anna Field. *Journal of Biological Chemistry*, Vol. 88, pp. 9-25; August, 1930.

A biological study of the effect of drying and of sulphur dioxide upon the vitamin A content of peaches, prunes, and apricots has elicited the following conclusions: The sulphured dehydrated fruits in all cases appear to retain the largest proportion of the vitamin. Of the unsulphured fruit, the sun-dried specimens of prunes and peaches showed a better retention of vitamin A than did the corresponding unsulphured dehydrated products. Lye dipping of dried prunes seemed to exert no effect upon vitamin A retention. Storage of both sulphured and unsulphured apricots and prunes at 0 deg. C. for a period of more than one year brought about no detectable loss of vitamin A content.

* * *

ENZYMIC CLARIFICATION OF CIDER. Zoltan I. Kertesz. New York State Agricultural Experiment Station, Bulletin No. 589; December, 1930.

An enzyme decomposing soluble pectin is proposed as an agent for assisting in the clarification of apple cider. This enzyme acts on pectin and produces no changes in starches or proteins. During the decomposition of the pectin of the apple juice by the enzyme, some insoluble materials are formed. These insoluble substances, together with other substances responsible for the cloudiness of cider, are easily removed by filtration or centrifugation, leaving a crystal clear product which may be pasteurized and bottled within 24 hours after pressing the cider. The product is very palatable and possesses no cooked taste.

* * *

CUTTING COSTS IN THE CAKE BAKERY. P. G. Pirrie. *Bakers' Weekly*, Vol. 69, p. 53, Jan. 3, 1931; p. 56, Jan. 10, 1931; p. 51, Jan. 31, 1931.

Costs in an efficiently operated bakery may be distributed as follows: ingredient cost, 38 per cent; manufacturing cost, 16 per cent; packaging cost, 8 per cent; selling cost, 23 per cent; overhead and profit, 15 per cent. Rigid cost control on various items will show certain factors which should be studied in order to lower costs. Ingredient cost can easily be cut 2 per cent. In one bakery a rearrangement of existing equipment resulted in raising the net profit from 1 per cent to 8.6 per cent. Handling of ingredients and location of mixing equipment also are discussed in relation to cutting costs in the cake bakery.

BOOK REVIEWS

HANDBOOK OF CHEMISTRY AND PHYSICS. By Charles D. Hodgman and Norbert A. Lange. Fourteenth Edition. Published by the Chemical Rubber Publishing Company, Cleveland, Ohio. 1,386 pp., 6⅞x4½; flexible. Price, $5.

TO THE thirteenth edition of this useful authoritative handbook have been added sections on fire precautions and fire hazards, four-place antilogarithms, and interest tables covering fifty years at rates from ¼ to 8 per cent. Further additions include sections on physical and chemical constants of resins, oleo-resins, and gum resins; volumetric quantitative reaction, Clark and Lubs indicator solution, conversion factors, McIlvaine's standard buffer solutions, electrolytic potentials, normal oxidation potentials, degree of ionization, solubility product, dissociation constants of acids and bases, electromotive force series of metals, ceramic shrinkage conversion tables, properties of dry air, properties of saturated air, weights of saturated and partly saturated air, pressures and velocities of dry air, altitude density, table for air, examples of deformation eutectics, amplification of tables on heats of combustion and formation, thermal expansion of glasses, specific heat of water, mechanical equivalent of heat, percentage composition of anti-freeze solutions, relative humidity, constant humidity, specific inductive capacity, sparkling potential spark, spectrum of air, transmission factors for ground glass transmission of radiation by various neutral and colored glasses, and values of "L.C."

Tables eliminated are on solubility product, dissociation constants of acids and bases, electromotive force series of metals, reduction of mercury in glass thermometer reading to the hydrogen scale, and heat values of fuels.

* * *

MATHEMATICAL TABLES FROM HANDBOOK OF CHEMISTRY AND PHYSICS. Published by the Chemical Rubber Company, Cleveland, Ohio. 172 pp., 6⅞x4½; flexible. Price, $1.

THIS collection is to provide in a practical, convenient form the tables of logarithms, trigonometric functions, numerical constants, and equations adequate for the ordinary computations of chemistry and physics.

* * *

THE CANADIAN FRUIT AND VEGETABLE CANNING, PRESERVING, AND DRYING INDUSTRIES. Published by the National Development Bureau, Department of Interior, Ottawa, Canada. 1930. 64 pp., 8½x13½; paper; 1 map.

THE object of this mimeographed report is to direct attention to the growing consumption of fruits and vegetables in their various preserved forms, and to the opportunities for further development of these industries.

The first section deals with the canning and preserving industry and contains chapters on the growth of the industry in Canada, advantages of the canned product, Canadian customs tariffs, consumption, markets, raw materials, containers, the plant, the canning process, production costs, government supervision, and new developments in the industry.

The evaporated and dehydrated fruit and vegetable industry is dealt with in the second section in a somewhat similar manner, while the third section contains the latest available information on markets for both the canned and dried product in 26 foreign countries. Lists of the licensed fruit and vegetable canning, preserving and drying plants, showing the names and addresses of the operating companies and products of each plant, as well as a map showing the location of these plants, the present agricultural areas, and the principal favorable areas for commercial production of the different varieties of Canadian fruits and vegetables, also are contained in this report, which may be obtained by those interested upon application to the Director, National Development Bureau, Department of the Interior, Ottawa, Canada.

* * *

INDUSTRIAL RESEARCH LABORATORIES OF THE UNITED STATES. Compiled by Clarence J. West and Callie Hull. Fourth Edition. Published by National Research Council as Bulletin No. 81, Washington, D. C. 1931. 267 pp., 9¾x6¾; paper. Price, $2.

THIS volume is a revision and enlargement of the 1927 edition to include more than 1,600 industrial research and consulting research laboratories. They are indexed according to name, geographical location, and subject of problems dealt with. Included is a list of the names and addresses of the directors of these research laboratories. Many of these laboratories deal with problems related to the food industries.

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GOVERNMENT PUBLICATIONS

DOCUMENTS ARE AVAILABLE *at prices indicated from Superintendent of Documents, Government Printing Office, Washington, D. C. Send cash or money order; stamps and personal checks not accepted. When no price is indicated pamphlet is free and should be ordered from bureau responsible for its issue.*

Coffee Exports, by Mary L. Bynum. Bureau of Foreign and Domestic Commerce Trade Promotion Series 110; 10 cents. A statistical résumé of the world's exports of coffee.

Date Processing, by A. F. Sievers and W. R. Barger. U. S. Department of Agriculture, Technical Bulletin 193; 15 cents. Reports experiments on the processing and storing of Deglet Noor dates in California.

Cannery Labor, by Caroline Manning. Women's Bureau Bulletin 82; 15 cents. Relates to employment of women in the pineapple canneries of Hawaii.

Baking Powder Chemicals, by L. H. Bailey. U. S. Department of Agriculture, Circular 138; 5 cents. Treats of the development and use of baking powder and baking chemicals.

Tomatoes, by James H. Beattie. U. S. Department of Agriculture, Farmers' Bulletin 1233; 5 cents. Relates to supply of tomatoes for canning and manufacturing. Revised November, 1930.

Vegetable Composition, by Charlotte Chatfield and Georgian Adams. U. S. Department of Agriculture, Circular 146; 5 cents. Gives proximate compositions of 121 varieties of fresh vegetables.

Potato Storage, by William Stuart. U. S. Department of Agriculture, Farmers' Bulletin 847; 5 cents. Gives recommendations regarding storage and storage houses. Revised November, 1930.

Apple Storage, by Charles Books and others. U. S. Department of Agriculture, Farmers' Bulletin 1160; 5 cents. Relates to diseases of apples in storage. Revision of October, 1930.

Federal Specifications. Federal Standard Stock Catalogue Board Specifications as follows: Dry powdered skimmed and whole milk, baking soda, table salt, vegetable salad oil, syrup, and oleomargarine. Five cents each.

Sweet Corn, by J. H. Beattie. U. S. Department of Agriculture, Farmers' Bulletin 1634; 5 cents. Relates to supplies for canneries.

Rat Control, by James Silver and J. C. Munch. U. S. Department of Agriculture, Leaflet 65; 5 cents. Describes use of red-squill power in rat control.

Rat Proofing. U. S. Department of Agriculture, Farmers' Bulletin 1638; 5 cents. Recommends methods for rat-proofing of buildings and premises.

Walnuts. Mimeographed document from Foodstuffs Division of Bureau of Foreign and Domestic Commerce. Descriptive summary giving general information.

Almonds. Mimeographed document from Foodstuffs Division of Bureau of Foreign and Domestic Commerce. Descriptive summary giving general information.

Selling Dried Fruits and Nuts. Mimeographed document of Merchandising Research Division, Bureau of Foreign and Domestic Commerce. One of a series of commodity studies from the Louisville grocery survey.

Pacific Salmon Fisheries, by John N. Cobb. Bureau of Fisheries, Document 1092; 65 cents. An elaborate descriptive and statistical report on the industry.

Food Regulations. Food and Drug Administration service and regulatory announcements, Food and Drug No. 1, Tenth revision.

Import and Export Classification. Bureau of Foreign and Domestic, Commerce Schedule A, statistical classification for imports, and Schedule B, statistical classification for exports. Schedule A, 45 cents; Schedule B, 20 cents.

Market Research. Bureau of Foreign and Domestic Commerce, Domestic Commerce Series No. 6, 1930 edition; 25 cents. A guide to publications and activities relating to domestic marketing.

Tariff Summary. Prepared by Tariff Commission for Ways and Means Committee of House of Representatives; 50 cents. A comparison of the Tariff Acts of 1913, 1922, and 1930, with index.

Agricultural Research Workers. U. S. Department of Agriculture, Miscellaneous Publication 93; 20 cents. List of technical workers in the department and outline of department functions, 1930.

Projects of Agricultural Experiment Stations. U. S. Department of Agriculture, Miscellaneous Publication 89; 35 cents. Classified list of projects active during 1930.

PATENT DIGEST

Baking and Milling

Ice Cream Cone Molds—Elton D. Kohr, York, Pa. Nos. 1,783,798 and 1,783,799. Dec. 2, 1930.

Automatic Bread Slicer With Gravity Feed to a Stationary Feed Plate—Anthony Tewes to Papendick, Inc., St. Louis, Mo. No. 1,784,397. Dec. 9, 1930.

Biscuit Cutting and Embossing Machine—Thomas Luther Green, Indianapolis, Ind. Nos. 1,784,431 and 1,784,432. Dec. 9, 1930.

Compression-Box Type Dough Divider—Frank H. Van Houten to Dutchess Tool Company, Beacon, N. Y. No. 1,784,559. Dec. 9, 1930.

Yeast Manufacture—John H. Barrington, Baltimore, Md. to Standard Brands Inc., Dover, Del. No. 1,784,618. Dec. 9, 1930.

Milling Whole Wheat Flour—Louis E. Smith, Minneapolis, Minn., to Hart-Carter Company, Peoria, Ill. No. 1,784,762. Dec. 9, 1930.

Rotary Bake Oven—Albert E. Grapp, Minneapolis, Minn. No. 1,785,079. Dec. 16, 1930.

Batter Fed Mechanically to Cone Machines—Charles Schroeder and Harry Tatosian to Ice Cream Cone Machinery, Inc., Bridgeport, Conn. No. 1,785,394. Dec. 16,

Rotary Baking Oven—Charles A. Wyman, Auburn, Wash. No. 1,786,142. Dec. 23, 1930.

Coated Ice Cream Cake—Donald Alec Battista, Washington, D. C. No. 1,786,387. Dec. 23, 1930.

Endless-Conveyor Type Proof-Box—William Ehrhart, Lancaster, Pa. No. 1,786,485. Dec. 30, 1930.

Phosphate Baking Powder With Increased Iron Content—Augustus H. Fiske, Warren, R. I., to Rumford Chemical Works, Providence, R. I. No. 1,787,193. Dec. 30, 1930.

Synchronized Feed and Oven Conveyor—Herbert Kirman and George Ralph Baker, Willesden, England, to Baker Perkins, Saginaw, Mich. No. 1,787,254. Dec. 30, 1930.

Canning and Glass Packing

Fruit-Pitting Machines With Fixed and Movable Impaling Blades—Earl R. Anderson, Los Angeles, Calif., to Pacific Machinery Company, San Francisco, Calif. Nos. 1,784,998 and 1,784,999. Dec. 16, 1930.

Fruit Mechanically Prepared for Coring or Pitting—Arthur L. Duncan, Oakland, Calif., to Pacific Machinery Company, San Francisco, Calif. Nos. 1,785,000, 1,785,001, and 1,785,002. Dec. 16, 1930.

Fruit Pitters—Arthur L. Duncan, Piedmont, Calif., to Pacific Machinery Company, San Francisco, Calif. Nos. 1,785,003, 1,785,004, 1,785,005, 1,785,006, 1,785,007, 1,785,008, 1,785,009, 1,785,010, and 1,785,022. Dec. 16, 1930.

Fruit Pitter—Narsete Felizianetti, Los Angeles, Calif., to Pacific Machinery Company, San Francisco, Calif. No. 1,785,011. Dec. 16, 1930.

Fruit Pitter—Hjalmar Goranson and David Goranson, San Jose, Calif., to Pacific Machinery Company, San Francisco, Calif. No. 1,785,012. Dec. 16, 1930.

Asparagus Cutting Machine—Louis D. Stoppel, Isleton, Calif. No. 1,785,795. Dec. 23, 1930.

Peach Pitter—George Wilcox, Riverside, Calif., to California Canning Machinery Company, Los Angeles, Calif. No. 1,786,724. Dec. 30, 1930.

Can-Body Laps Cleaned by Scraping Before Soldering—Joseph Howard Renshaw, Cincinnati, Ohio, to Continental Can Company, Inc., New York City. No. 1,787,324. Dec. 30, 1930.

Confectionery

Confection Clusters Coated Mechanically—Elmo G. Lanzi to Bonus Candy Corporation, Chicago, Ill. No. 1,785,835. Dec. 23, 1930.

Enrober for Coating Clusters in Molds—Walter C. Drury, Fulton, Ill. No. 1,786,108. Dec. 23, 1930.

Chewing-Gum-Coated Ice Cream Confection—Edward L. Gordon, Pittsburgh, Pa. No. 1,786,606. Dec. 30, 1930.

Industrial Corn Popper—Elmer B. Thompson to National Sales & Manufacturing Company, Des Moines, Iowa. No. 1,786,877. Dec. 30. 1930.

Egg-Shaped Confection Shells—William Stevens, Los Angeles, Calif., to Jack Hibbard, Detroit, Mich. No. 1,771,065. July 22, 1930.

Fabric-Covered Candy Boxes With Decorated Glossy Finish—Leonard Michael, Bronxville, N. Y., to American Can Company, New York City. No. 1,773,926. Aug. 26, 1930.

Enrober Equipped With Pump Mechanism for Coating Bottoms as Well as Tops of Confections—Emile Louis Alfred Savy, Paris, France. No. 1,775,475. Sept. 9, 1930.

Chocolate Shells Made and Filled With Ice Cream—Wilson R. Myers and Bernhard O. Opitz to Ice Cream Smack Corporation, Portland, Ore. No. 1,775,597. Sept. 9, 1930.

Confection Dummies for Display Purposes—Tom Errington and William Errington, Portsmouth, England. No. 1,776,622. Sept. 23, 1930.

Dairy and Egg Products

Opener and Closure for Paper Milk Bottles—Joseph J. Schmerler, New York, N. Y. No. 1,785,599. Dec. 16, 1930.

Closure for Glass Milk Bottles—Durlin N. Van Alstyne, Syracuse, N. Y.; one-half to James N. Van Alstyne, Fulton, N. Y. No. 1,785,716. Dec. 16, 1930.

Copies of Patents

Complete specifications of any United States patent may be obtained by remitting 10c. to the Commissioner of Patents, Washington, D. C. Photostatic copies of foreign patents may be obtained at the same address, prices being forwarded on application.

Copies of patents should be ordered by number, as titles used in this digest seldom correspond with title of patent.

Folding Cap for Milk Bottles—Lillian Towy, Inglewood, Calif. No. 1,786,140. Dec. 23, 1930.

Orange Butter Coloring Lightened by Adding Green Coloring Material—Karl J. Monrad to Chr. Hansen's Laboratory, Inc., Little Falls, N. Y. No. 1,786,256. Dec. 23, 1930.

Fat Coated Blocks of Sweetened Milk and Cream Solids—Philipp Born, Bad Homburg, Germany, to Naamlooze Vennootschap Nederlausche Gruyère—Blokmelk Fabrick, Zwolle, Netherlands. No. 1,786,559. Dec. 30, 1930.

Milk-Bottle Capper That Inverts Cap—Eugene R. Leighton to Jennie E. Leighton, North Andover, Mass. No. 1,786,760. Dec. 30, 1930.

Vat-Type Pasteurizer—Arthur H. Boileau, Cedar Rapids, Iowa, to Cherry-Burrell Corporation, Wilmington, Del. No. 1,786,819. Dec. 30, 1930.

Milking Machine—Floyd G. Hodsdon to International Harvester Company, Chicago, Ill. No. 1,786,846. Dec. 30, 1930.

Gas-Treated Milk Powder—Irving S. Merrell and Helge Schibsted, Syracuse, N. Y., to Merrell-Soule Company, Inc., New York City. No. 1,786,858. Dec. 30, 1930.

Vacuum Milking and Container Equipment on Rotating Platform—Cyrus Howard Hapgood, Nutley, N. J., to DeLaval Separator Company, New York City. No. 1,787,152. Dec. 30, 1930.

General Equipment

Friction Clutch—Lee B. Green, Lakewood, to the Borden Company, Warren, Ohio. No. 1,781,173. Nov. 11, 1930.

Pressure-Actuated Valve—Anton Compula, Garfield Heights, Ohio. No. 1,781,366. Nov. 11, 1930.

Apparatus for Maintaining a Predetermined Water Level in Steam Boilers—George Heinrich Davin, Cassel, Germany, to Schmidt'sche Heissdampf, G.m.b.H., Cassel—Wilkelmshohe, Germany. No. 1,781,749. Nov. 18, 1930.

Liquid-Level Indicator—Thomas M. Eynon, Philadelphia, Pa. No. 1,782,233. Nov. 18, 1930.

Rotary Pump of the Oscillating-Blade Type—Louis Ildevert Poirmeur, Meru, France. No. 1,782,314. Nov. 18, 1930.

Refrigerator-Display Case—Virgil P. Warren, Atlanta, Ga. No. 1,782,523. Nov. 25, 1930.

Rotary Pump—Dexter C. Baker, Oakland, Calif., to Baker-Hansen Manufacturing Company, Alameda, Calif. No. 1,782,771. Nov. 25, 1930.

Flexible Handrail for Stairways—William O. Hartman, to Welsh-Hartman Company, St. Louis, Mo. No. 1,782,895. Nov. 25, 1930.

Boiler Feed-Water Controlled Automatically—James Lewis Kimball, Beverly Mass., to Ruggles-Klingemann Manufacturing Company, Salem, Mass. No. 1,782,926. Nov. 25, 1930.

Flexible Mechanism for Cleaning Drain Pipes—John C. Miller, Chicago, Ill. No. 1,783,256. Dec. 2, 1930.

Mixing Valve—Louis Sirotek, Chicago, Ill. No. 1,783,264. Dec. 2, 1930.

Ventilator That Muffles External Sounds—Howard R. Bliss, Flushing, N. Y. No. 1,783,276. Dec. 2, 1930.

Condenser for Vapors—Emanuel W. Hartman, Phoenix, Ariz. No. 1,783,286. Dec. 2, 1930.

Temperature Inside Pulverizing Mills Controlled Automatically—Joe Crites and Walter A. Koren, Evanston, Ill., to Raymond Brothers Impact Pulverizer Company, Chicago, Ill. No. 1,783,358. Dec. 2, 1930.

Condenser for Stills—Philip B. Sadtler, Chicago. Ill., to Swenson Evaporator Company, Harvey, Ill. No. 1,783,369. Dec. 2, 1930.

Scale Removed From Water Jackets of Internal Combustion Engines—Walter N. Moore to Three-M Manufacturing Company, Kansas City, Mo. No. 1,783,478. Dec. 2, 1930.

Carton Conveyor and Sealer—Arthur C. Schroeder and Wallace D. Kimball, New York, N. Y., to Standard Sealing Equipment Corporation, Long Island City, N. Y. No. 1,783,814. Dec. 2, 1930.

Rotary Soot Cleaner for Boilers—Frederick W. Linaker and Theodore M. Bruback, Du Bois, Pa. No. 1,784,491. Dec. 9, 1930.

Automatic Weight-Checker and Sorter—David W. Ripley to Sun-Maid Raisin Growers of California. Fresno, Calif. No. 1,784,540. Dec. 9, 1930.

Water-Softening Equipment—Emil G. Duden to Wm. B. Scaife & Sons Company, Oakmont, Pa. No. 1,784,893. Dec. 16, 1930.

Sliding-Door Hanger—Bernard Rowntree, Carmel Highlands, Calif. No. 1,784,910. Dec. 16, 1930.

Continuous Screw Press—William McDonald to Swift & Company, Chicago, Ill. No. 1,785,041. Dec. 16, 1930.

Means for Fastening Barrel Heads—Donald B. McDonald, Quitman, Ga. No. 1,785,133. Dec. 16, 1930.

Quality of Stack Smoke Indicated and Recorded—Frank Sawford and Frank Sawford, Jr., Vancouver, British Columbia, Canada. No. 1,785,392. Dec. 16, 1930.

Density of Stack Smoke Determined—Frank Sawford, one-half to Frank Sawford, Jr., Vancouver, British Columbia, Canada. No. 1,785,393. Dec. 16, 1930.

Air-Conditioning System—Carrol E. Lewis, St. Paul, Minn., to the Lewis Corporation, Inc., Minneapolis, Minn. No. 1,785,741. Dec. 23, 1930.

Electric Heater and Fan Combination—Royal C. Vilas, Golf, Ill. No. 1,785,752. Dec. 23, 1930.

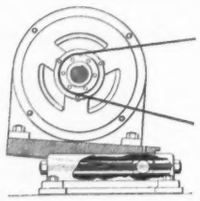
A Rotating Boiler Cleaner That Has a Shuttle-like Motion—Norman L. Snow to Diamond Power Specialty Corporation, Detroit, Mich. No. 1,785,821. Dec. 23, 1930.

Vacuum Condensation Pump—Augustus C. Durdin, Jr., Chicago, Ill. Nos. 1,786,055 and 1,786,056. Dec. 23, 1930.

NEW EQUIPMENT FOR FOOD MANUFACTURERS

Short-Center Belt Drive

A SHORT-CENTER drive system perfected by the Rockwood Manufacturing Company, Indianapolis, Ind., is reported to give improved power transmission when flat-surfaced leather belts are used. The accompanying illustration shows the important factors in the system. The motor fitted with a



Rockwood pulley is mounted on a hinged base. This mounting enables gravity, due to the weight of the motor, to maintain the belt under predetermined tension to meet the power requirements of the installation.

Although this system has been used in trial installations for three or four years it has become available in perfected form only within the past few months. It is asserted that this drive is adapted to close pulley centers and that it operates the belt at all times under constant, uniform tension, which reduces slippage.

New Frequent-Stop Delivery Truck

A SPECIALIZED delivery truck for all house-to-house delivery service has been announced by the DiVco-Detroit Corporation, of Detroit, Mich. It is known as the Model "H" and incorporates a low aisle with a one-piece, drop-frame construction. The low, free aisle permits the driver to pass through from either side with the driver's collapsible seat in position.

This truck can be driven from a standing position, and has accelerators on the floor board, steering posts, and shifting lever. It incorporates the patented combination clutch and brake pedal with automatic brake lock which has appeared on other DiVco models, making it possible for the driver to disengage his clutch, apply the brake, and lock it with one movement of his foot.

The truck is powered with a specially designed 4 cylinder Continental Motor, with special manifolding to reduce fuel consumption during the idling period, which constitutes about 65 per cent of the time that a milk delivery truck is on the route. This truck is designed for use in frequent-stop service characteristic of milk or bakery routes, where 100 to 300 starts and stops are made per day.

New Use for Stainless Metal

SHIPPING cans of 20-gal. capacity have been added to the chromium-nickel alloy line of the Lalance & Grosjean Manufacturing Company, 405 Lexington Ave., New York City. These cans are said to be finding use in the fruit-juice industry and to be unaffected by the fruit acids. They are now being deep-drawn in one piece from 17-gage metal and are supplied in three finishes: white pickled outside and polished inside; polished both outside and inside; and white pickled outside and inside.

Cans made by deep-drawing have slightly rounded bottoms and are much easier to clean and keep sanitary than those made from more than one piece. They also have high resistance to abrasions, indentations, and other distortions likely to result from rough handling. Sizes other than 20-gal. capacity are being considered.

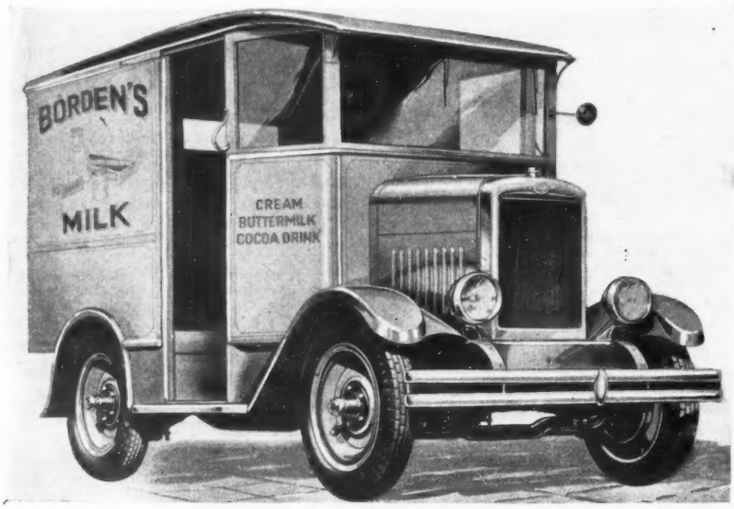
An Aid to Centralized Meat Cutting

LARGE-VOLUME production of meat cuts for retailing or freezing purposes is made possible by the development of such machines as the "Type E" slicing machine of Link-Belt Company, 300 West Pershing Road, Chicago, Ill. This machine is reported to cut chops of uniform thickness at the rate of 150 cuts per minute

under industrial conditions. These cuts may be from $\frac{3}{8}$ to $\frac{3}{4}$ in. thick.

This unit is equipped with a heavy one-piece steel knife on a flywheel mounting and is operated by a 3-hp. motor through a silent-chain drive. All operating parts are guarded to prevent injury to operator, yet are easily accessible for cleaning, inspection, and repair purposes. Semi-automatic in operation, it does not require an operator of special skill to maintain high rate of production.

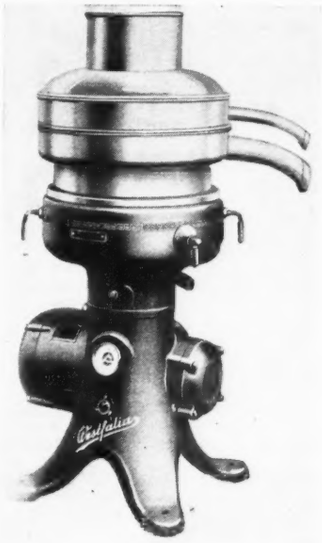
This same company has developed



the "Type D" beef chipping machine shown in the accompanying illustration, which is similar to the slicing machine in construction and operation. This chipper, designed especially for cutting beef, is said to have a range of 51, 54, 57, and 60 slices per inch of thickness and an output of 500 slices per minute. This output is declared to be 65 per cent greater than that obtained with the combination beef chipping and bacon slicing machines commonly used.

Centrifugal Whey Separator

A CREAM separator with special attachment to make it suitable for use as a whey separator is announced by the Westfalia Separator Company, 11 West 42d St., New York City. In addition to the feature that makes it of practical use for whey separation, this machine is equipped with a smooth bowl shell as an aid to easy cleaning. A



main slime chamber with small overflow pipes gives good pre-clarification of milk and helps to keep the disks clean even during long runs. Small slot channels connect the pre-slime space with the main slime chamber and make prefilling of the bowl unnecessary.

Other construction details provide for foam and power-cost reduction, liberal lubrication of wearing parts, indication and control of bowl speed, and easy and even engaging of driving gearteeth. This model is driven by an inclosed electric motor with a driving pulley that is a centrifugal friction coupling.

New Type Refiner

A THREE-ROLL refiner equipped with hydraulic-piston adjustments has been developed by William Wharton, Jr., & Company, Easton, Pa. Each roll is fitted with pressure gages to indicate the pressure per square inch on the back and middle rolls and on the front and middle rolls. Careful adjustment of these pressures permits standardization of refining conditions to produce products of desired fineness and is said to increase pound production per unit roll surface. These features are particularly important in such operations as refining chocolate liquor and pastes, where it is desirable to duplicate finished products of varying degree of fineness.

The rolls are of chilled cast iron, internally water-cooled, and fitted with herringbone gears. The adjustable side hopper plates are self-locating and make contact with the ends of the middle and back rolls instead of with the refining surface. This eliminates wear and heating. The discharge apron moves with the front roll carriage to maintain constant pressure against the roll.

This refiner is being produced in standard sizes of 10x16, 12x30, 16x40, and 20x60 in.

MANUFACTURERS' PUBLICATIONS

Underfeed Stokers—In a well-illustrated 26-page booklet, the Combustion Engineering Corporation, 200 Madison Ave., New York, N. Y., describes and gives application for its type E Stoker with center retort.

Recording Gages With Steel Springs—In bulletin 168, a 24-page bound booklet, the Foxboro Company, of Foxboro, Mass., describes, illustrates, and gives uses for its steel spring recording gages.

Portable Colloid Mill—The Disper-Mill, manufactured and sold by the Diamant Tool & Manufacturing Co., Inc., 401 Mulberry St., Newark, N. J., is described in an illustrated leaflet recently prepared.

Cork Board Insulation—A 16-page booklet entitled "Cork and Insulation" prepared by the United Cork Companies, Lyndhurst, N. J., lists and describes the various types of cork products and illustrates by photographs and drawings industrial uses of cork insulation.

Electric Welders—Electric welders with ratings of 400 and 600 amp. are announced and described by the Lincoln Electric Company, Cleveland, Ohio.

Roller Mill Equipment—Bulletin 1242, prepared by the Allis-Chalmers Manufacturing Company, Milwaukee, Wis., is a 64-page booklet catalog in which equipment peculiar to the milling industry is illustrated and described.

Condensed Chemical Dictionary — In an illustrated folder, the Chemical Catalog Company, Inc., 419 Fourth Ave., New York City, announces a second edition of its condensed chemical dictionary and illustrates the manner in which subject matter is treated.

All-Purpose Detergent—A 16-page booklet, published by Quigley Company, 56 West 45th St., New York City, describes Annite and gives some of its industrial uses.

Refrigerating Equipment—In a series of bulletins recently published, the Vilter Manufacturing Company, Milwaukee, Wis., illustrates, describes, and gives specifications regarding its vertical ammonia compressors, valves for automatic control of ammonia feed, shell and tube brine coolers, vertical tube and shell condensers, multi-stage compression for low temperatures, vertical twin-cylinder ammonia compressors, horizontal multi-pass shell and tube condensers, ammonia regenerators, and raw-water ice plants.

Emulgo—A 12-page booklet containing a description of lecithin prepared for the chocolate trade and reprints of articles that have appeared in American and English trade journals dealing with lecithin has been compiled and published by Fredk. Boehm, Ltd., 17 Jewry St., London, E. C. 3.

Thermostats, Small Motors and Other Electrical Equipment—A series of illustrated inserts for loose-leaf catalogs describing fractional horsepower motors, induction motor generator sets, cam type master switches, gear and track type limit switches, thermostats for industrial heating units, and edgewise-wound resistors has been published by the General Electric Company, Schenectady, N. Y.

Power Lift Trucks—An electric, industrial power lift truck has been developed for use with hand truck platform skids, 7 in. high or over, by the Crescent Truck Company, Lebanon, Pa. An illustrated letter described this piece of equipment.

High-Pressure Laboratory Press—Fred S. Carver, 90 West St., New York, announces and describes his hydraulic, hand-operated, high-pressure press by illustrated leaflets and folder.

Coffee Roasters—Typical installations for coffee roasting made by Jabez Burns & Sons, Inc., 11th Ave. & 43d St., New York City, are given in an illustrated leaflet. Only the 1930 installations are shown.

Chemicals—R. & H. Chemicals are listed and priced in leaflets sent out by Roessler & Hasslacher Chemical Company, 10 East 40th St., New York City.

Paper Bags — Flat- and square-opening paper bags and their manufacturers are listed according to trade names, standard weight, and miscellaneous classifications by folder compiled and published by the Paper Bag Manufacturers' Institute, 11 West 42d St., New York City.

Water Heating Condenser — DeLaval Water Heating Condenser for turbine-driven separators is announced and described in a leaflet distributed by the DeLaval Separator Company, New York City.

Electrical Equipment — In a series of folders for a loose-leaf catalog, the General Electric Company, Schenectady, N. Y., describes and gives specification data on its electric air drawing ovens, automatic low-voltage controllers, general-purpose synchronous motors, semi-automatic reduced voltage starters for synchronous motors, atomic-hydrogen arc-welding equipment, photo-electric relay, Selsyns for remote signaling control and indication, and its electric operators which exert a smooth straight line thrust in one direction.

Hard-Rubber Equipment — American Hard Rubber Company, 11 Mercer St., New York City, in a 54-page catalog lists, describes, and illustrates by photograph and diagrammatic drawings a diversified line of items made from hard rubber; also includes a list of industries using hard-rubber equipment.

NEWS OF THE MONTH

Retail Food Price Decreases Too Slight, Senate Sub-Committee Holds

VOLUMINOUS testimony relating to the price of bread, milk, and other staple foods presented to a sub-committee of the Senate Committee on Agriculture and Forestry at hearings in Washington, Feb. 10 to 19, offered no satisfactory explanation for the increased spread between prices paid to the farmer and prices paid by the consumer for foodstuffs, according to Senator Capper, of Kansas, chairman of the sub-committee. "There is cause for alarm in the marked tendency toward consolidation and combination among those handling foodstuffs," the Senator said. "It is a menace to the country to reach a condition when bread, milk, meat, and other foodstuffs are controlled by a few people."

The fact that the price of bread was lowered in Washington as a result of the hearing indicates that the spread is too wide generally, according to Senator Townsend, of Delaware, another member of the committee. "The price paid by the consumer is all out of proportion to the price paid by the producer of raw materials," Senator Frazier, of North Dakota, another member, is reported to have said. It appears, therefore, that evidence presented by a number of leading food manufacturers did little to change the opinions held by the Senators.

Senator Capper opened the inquiry by questioning a number of leading figures in the milling and baking fields. Ethelbert Stewart, Commissioner of Labor Statistics, pointed out that flour prices followed wheat prices very closely, and George Livingston, chairman of the Millers' National Federation, denied the existence of any combination of milling and baking interests.

Bakers' Income Declines

The decline in income to bakers because of price reductions already in effect has been more than the saving in raw materials, according to Henry Stude, president of the American Bakers' Association. The figures presented by the Commissioner of Labor Statistics showing little decrease in bread prices were in error, according to F. H. Frazier, chairman of the board of the General Baking Company, because they include only the highest quality of bread. A reduction of $3 a barrel in the price of flour is necessary to warrant a reduction of 1c. in a loaf of bread, he said.

M. Lee Marshall, chairman of the board of the Continental Baking Company, called attention to the fact that his organization had reduced bread prices in 37 of its 83 bakeries and increased weight in 68 of them. A further reduction could be accomplished only at a sacrifice of quality and a cut in labor costs, he maintained. Profits per loaf in the last five-week period of 1930 were about $0.0049, he pointed out. Frank W. Wheeler, assistant to the president of the Great Atlantic & Pacific Tea Co., testified that his company is making a pound loaf of bread and selling it at a profit for an average of 5.52c. He said that his company had no Washington bakery.

While the inquiry was still in session A. & P. announced that it would sell bread brought to its Washington stores from bakeries in near-by cities for 5c. per pound loaf. A reduction of 1c. a loaf in the price of whole-wheat bread also was announced by the Continental Baking Corporation for Washington and a number of other cities, during the course of the investigation.

Bread prices in Washington are too high and this condition would be remedied if there were more independent bakeries to compete with the large concerns, according to W. M. Hornstein, president of the United Food Stores, an organization of independent grocers.

In regard to the price of sugar, James H. Post, president of the National Sugar Refining Company, told the group that competition in the industry is so keen that manufacturers consider themselves fortunate to realize a profit of 10c. on 100 lb. of sugar.

Conflicting figures, which show that price conditions vary widely in different sections of the country, were presented at the investigation of milk prices. A wider spread exists between the prices charged to consumers of milk in cities and the prices paid to farmers than at any time in the past nine years, according to statistics from the Department of Agriculture, laid before the group.

Fred H. Sexauer, president of the Dairymen's League Co-operative Association of New York, and F. D. Walmsley, president of the Borden Farm Products Corporation of Illinois, testified, on the other hand, that retail prices have followed the wholesale trend.

COMING EVENTS

MARCH

16-19—American Society of Bakery Engineers, Edgewater Beach Hotel, Chicago, Ill.
18—United States Beet Sugar Association, Washington, D. C.
25—Association of Cocoa & Chocolate Manufacturers of the U. S., New York City.
30-April 3—American Chemical Society, Indianapolis, Ind.

APRIL

10-26—Amsterdam Confectionery Exposition, Amsterdam, Holland.
13-14—Bakery Sales Promotion Association, Fort Pitt Hotel, Pittsburgh, Pa.

MAY

6-8—American Society of Refrigerating Engineers, Kansas City, Mo.
7—National Cheese Institute, Inc., Schroeder Hotel, Milwaukee, Wis.
18-21—American Association of Cereal Chemists, Brown Hotel, Louisville, Ky.

JUNE

2-5—National Confectioners' Association, Stevens Hotel, Chicago, Ill.

Bread Irradiation Process Sought by General Baking

INCORPORATION of vitamin D in bread by a process developed at the University of Toronto may be commercially applied in the United States by the General Baking Company, university sources have stated. Officials of the company, however, refused to comment on the report. Mead-Johnson & Company, Evansville, Ind., will use the process for a product known as "Mead's Cereal." This information follows reports from Toronto, quoted by the New York *Times* on Feb. 12, that $1,000,000 had been offered the university for rights to the process, which was developed in research work at the Hospital for Sick Children in Toronto.

The process can be immediately applied to commercial use, it was pointed out by one of those connected with the research work, being "simply a matter of adjusting the process to large-scale production." It was emphasized that the university would have to be sure that such products met its standards, as was the case when "sun wheat biscuit" irradiated by ultra-violet rays acting on certain substances incorporated in the product, was put on the market in Canada recently.

Private Brands Appear To Be Gaining

OF 306 wholesale grocers throughout the country, 194, or more than 60 per cent, are using private brands to some extent, according to a survey made by the United States Printing & Lithographing Company in which every effort was made to reach an impartial verdict. More than half of those replying, 156, reported that over 50 per cent of the business on items handled both ways was with the private brand products.

Eighty per cent of those using private brands reported a relative gain in sales volume. Over 75 per cent stated that they were increasing the practice.

Included in the lines of 61.1 per cent of those using private brands are more than 50 such items. Fifteen of those replying use private brands on over 300 different items.

Uphold Change in Size of Evaporated Milk Can

IN THE face of concerted opposition by chain stores, the Evaporated Milk Association has not altered its plan to reduce the size of the tall can from 16 oz. to 14½ oz., and the smaller container will be offered by all dealers on or about March 1.

Two reasons are offered in support of the change. The new 14½-oz. can is the equivalent, in terms of food value, of a legal standard quart of milk in nearly every state.

Secondly, the new can can be produced at a cost that permits its sale by the retailer with reasonable profit at 10 cents or less. The necessity for odd prices, such as 11 or 12 cents, is met by considerably more sales resistance than lower figures, and the tendency has been for non-profit selling in many cases to escape this resistance.

Yellow Margarine Tax Bill Expedited in Congress

LEGISLATIVE action that will once more subject yellow margarine to a federal tax of 10c. per pound will be taken at the present session of Congress, according to present indications. Favorably reported by both the Senate and the House, the Townsend-Brigham bill to subject all yellow margarine, regardless of the source of coloration, to the tax occupies a preferred status in the House. Under a special rule adopted Feb. 19, the rules committee has agreed to bring the matter up for a vote before March 4.

The bill also is on the Senate calendar, but consideration had been blocked up to Feb. 20 by the objection of Senator Sheppard, of Texas. Aimed at the sale of margarine deriving its color from palm oil, which, it has been ruled, it not "artificial coloring," the new bill specifies that the tax shall apply to all margarine which has a tint or shade containing more than 1.6 deg. of yellow, or yellow and red collectively, but with an excess of yellow over red, as measured by the Lovibond scale or its equivalent.

The agitation arising as a result of the growing use of low-tax palm oil margarine has led also to legislative action in a number of states. In New York State, a bill would require the same change in color requirements as the federal law. Another, also modeled after a proposed federal statute, would prohibit the use of margarine in state institutions.

Manufacturers of margarine would be required to pay an annual license fee of $1,000 under provisions of a bill introduced in the Wisconsin Legislature. Retail dealers would have to pay fees of $300; hotel proprietors, $100; and operators of boarding houses and lumber camps, $50, if they serve or sell butter substitutes.

In Vermont, a bill has been introduced requiring all margarine sold in the state to be colored green. The dairy and foods committee of the Ohio House of Representatives has recommended by a unanimous vote passage of a bill prohibiting the sale of yellow margarine.

Food Price Decline Slows Up

Although general business conditions have indicated an uncertain trend during the past month, food prices have declined steadily, but less abruptly.

Since the middle of January, *The Business Week* index has fallen from 80 per cent, as reported in the February issue of FOOD INDUSTRIES, to a low of 77 per cent. As we go to press it shows a rebound to 78.2 per cent. During the month ending Jan. 15, wholesale prices of food fell off 2.07 per cent in comparison with an average decline of 1.78 per cent for all commodities. This is in contrast with a 4.55 per cent decline for food during the month ending Dec. 15. During the 12-month period, food prices decreased 17.59 per cent against a total of 17.56 per cent for all commodities.

Retail prices of food as of Jan. 15 had duplicated their 3 per cent decrease as indicated for the month ending Dec. 15. For the year ending Jan. 15, the total decrease was 14½ per cent, a 1.5 per cent greater decline than for the 12-month period ending Dec. 15. Total decline in wholesale prices is still greater than that of retail prices by a difference of 3.09 per cent. On Dec. 15 the difference was 4 per cent.

Reports indicate that volume of sales made by retail food stores during the month of January, 1931, was greater in tonnage but lower in dollar value than during January, 1930.

Monthly Mayonnaise Report May Be Established

AN EFFORT to establish a monthly statistical summary of mayonnaise sales is being fostered by the Mayonnaise Manufacturers' Association. The U. S. Department of Commerce has agreed to collect data showing sales of mayonnaise, both by volume and by value, if a sufficient number of manufacturers will co-operate by furnishing figures. Figures from individual companies, of course, will be held strictly confidential, only the combined information being made public.

A letter to all mayonnaise manufacturers asking whether they are willing to co-operate by supplying such figures, and urging them to do so for the benefit of the industry as a whole, has been sent out by the association. Suggestions as to how such information should be compiled to make it most useful are also asked. Mayonnaise manufacturers who may not have received this communication and are in favor of the establishment of such a service are requested to send their approval to the secretary of the association at 1500 Walnut St., Philadelphia, Pa.

Distribution Data Appear On Chocolate and Cocoa

PRELIMINARY tabulation of results of the U. S. Census of Distribution on channels by which chocolate and cocoa products find a market have just been released by the Department of Commerce. A table summarizing the data is shown below.

Sales by Manufacturers of Chocolate and Cocoa Products, 1929

	Selling Value (F.o.b. factory)	Percentage of Sales	Number of Plants
Value of Products	$117,410,000	.....	.....
Interplant Transfers	9,592,000	.....	15
Total Sales	107,818,000	100	*58
Sales to manufacturers' own wholesale branches†	9,769,000	9.1	15
Sales from factories:			
To dealers			
Wholesalers	74,765,000	69.3	38
Retailers	17,671,000	16.4	17
To industrial consumers	5,613,000	5.2	12

*The total number of establishments engaged primarily in the manufacture of chocolate and cocoa products is 58. Inasmuch as some establishments sell to more than one type of customer, this total is less than the total of the figures shown below.

†This report does not cover the sales by manufacturers' own wholesale branches to wholesalers, to retailers, and to industrial consumers.

Patent Number Error

The process of selective irradiation developed at the University of Cincinnati by George Sperti, arrangements for commercial rights of which were recently acquired by General Foods Corporation, is covered by U. S. Patent No. 1,676,579. This patent number was erroneously given as No. 1,767,579 in FOOD INDUSTRIES (page 86) last month.

Label Wording and Canning Standards Officially Announced

REGULATIONS prescribed by the Food and Drug Administration for enforcement of the Mapes sub-standard amendment will go into effect May 18, or 90 days from their publication, according to an official announcement of the acting Secretary of Agriculture made on Feb. 16. The ruling culminates a lengthy and involved series of experiments, conferences, and tentative plans following the passage of the amendment to set up a label designation that will give the general public a correct conception of the products and standards that would be fair to the trade and legally enforceable.

The official designation, in the size of type required for cans under 1 lb. in net weight is shown below.

Below U. S. Standard
Low Quality But Not Illegal

The type requirements for the label designation on various can sizes are as follows:

For containers under 1 lb. net weight: first line, 12-point Cheltenham bold, condensed; second line, 8-point Cheltenham bold, condensed.

For containers from 1 to 5 lb. net weight: first line, 14-point Cheltenham bold, condensed; second line, 10-point Cheltenham bold, condensed.

For containers over 5 lb. net weight: first line, 24-point Cheltenham bold, condensed; second line, 18-point Cheltenham bold, condensed.

The regulations further provide that the can must be marked "slack filled" if the contents occupies less than 90 per cent of the closed capacity.

The standards for canned peas, canned peaches, and canned pears as issued are considerably altered from their tentative form as introduced by the Food and Drug Administration at the canners' convention in January.

Standard for Canned Peas

Canned peas are the normally flavored and normally colored canned food consisting of the tender, immature, unbroken seed of the common or garden pea (Pisum sativum), with or without seasoning (sugar, salt), and with added potable water in such proportion that when the contents of the container are poured out and returned to the container, standing on a level surface, and the peas leveled with a spoon without downward pressure, the liquor is not above the upper level of the peas.

MEANING OF TERMS

The term "normally colored," as it relates to the peas, means a general effect of green, with not to exceed 4 per cent by count of discolored peas, such as brown or brown spotted peas.

The peas shall be considered tender if 90 per cent or more by count are crushed by a weight of less than 907.2 grams (2 lb.) by the following method: Remove the skin of the pea and place one cotyledon on its flat surface on a horizontal, smooth plate. By means of a second horizontal, smooth plate apply vertically an initial load of 100 grams and increase the load at a uniform, continuous rate of 12 grams per second until the cotyledon is compressed to one-fourth its original thickness.

The pea seed is considered unbroken if 80 per cent or more of the units by count are in such a condition that the two cotyledons are still held together by the skin, even though the cotyledons may be cracked or partially crushed, or the skin split. Each major portion of a skin or cotyledon not included in the above definition is considered as a broken pea.

Standard for Canned Pears

Canned pears are the normally flavored and normally colored canned food consisting of (1) the normal- and uniform-sized, tender, peeled, mature, unblemished, unbroken halves of the fruit of the pear tree, from which the calyx end and seed cells have been removed, with or without removal of the internal stem, and (2) sugar solution.

The weight of fruit in the container is not less than two-thirds the weight of water which the sealed container will hold at 68 deg. F., except that when necessary to prevent crushing of the fruit a tolerance not exceeding the weight of one average piece is allowed. The liquid portion of the finished product reads not less than 13 deg. Brix (read at the proper temperature for the instrument used).

MEANING OF TERMS

The term "normally colored," as it relates to the fruit, means a general translucent yellowish white color.

Units of three-fourths of an ounce or larger are considered of normal size.

The units shall be considered uniform in size if neither the maximum length nor width of any unit varies more than 25 per cent from the corresponding average dimension of the pieces of fruit in the container.

The fruit shall be considered tender when not less than 80 per cent of the units by count are completely perforated by a cylindrical rod, $\frac{5}{32}$ in. in diameter, under a load of 300 grams (approximately 10.6 oz.), applied vertically to the exposed, peeled surface of a test piece carefully fitted into an appropriate holder. In performing this test, the rod is placed on the exposed surface under an initial load of 100 grams and the load increased at a uniform, continuous rate of 12 grams per second until the piece is perforated. A convenient method of obtaining the test piece is as follows: Using a cylinder of approximately 1¼ in. diameter, made of sheet metal approximately $\frac{1}{32}$ in. thick, cut a core from the fruit completely through from the inner surface to the peeled surface so that the peeled surface is exposed when the cylinder retaining this core is firmly supported on a horizontal, smooth plate. The fruit shall not, however, be so soft that the pieces in the can lose their natural shape when the container is opened and the product is carefully removed to a dish.

The fruit shall be considered peeled if 80 per cent or more of the pieces are free from skin, and no single piece carrying skin is less than 75 per cent peeled.

The fruit shall be considered unblemished if 80 per cent or more of the pieces in the container are free from scabs, bruises, gritty portions, raggedness, pink or brown colorations, or other unsightly blemishes. The term "raggedness" means a frayed condition of the edges.

The fruit shall be considered as unbroken halves when 80 per cent or more of the units are unbroken and not excessively trimmed. Excessive trimming is defined as that amount which destroys the normal shape of the half.

The weight of the fruit in the container means the fruit material in both the solid and liquid components. It is thus equivalent to the "put-in weight."

EXCEPTIONS

Canned pears which fail to meet the above standard only in that they consist of pears packed in water, need not bear the low quality legend if labeled "water-pack pears."

Canned pears which fail to meet the above standard only in that they consist of peeled, whole pears, need not bear the low quality legend if labeled "whole pears," even though the units may fail to meet the requirement, for normal size.

Canned pears which fail to meet the above standard only in that they are uniformly quartered, need not bear the low quality legend if labeled "quartered pears," even though the units may fail to meet the requirement for normal size.

Canned pears of a type where gritty portions are a normal characteristic, for example, Kieffer pears, need not bear the low quality legend because of grittiness alone if labeled to show the particular type to which they belong.

Standard for Canned Peaches

Canned peaches are the normally flavored and normally colored canned food consisting of (1) the normal- and uniform-sized, tender, peeled, mature, unblemished, pitted, unbroken halves of the fruit of the peach tree, and (2) sugar solution.

The weight of fruit in the container is not less than two-thirds the weight of water which the sealed container will hold at 68 deg. F., except that, when necessary to prevent crushing of the fruit, a tolerance not exceeding the weight of one average piece is allowed. The liquid portion of the finished product reads not less than 14 deg. Brix (read at the proper temperature for the instrument used).

MEANING OF THE TERMS

The term "normally colored" as it relates to the fruit means a general effect of yellow.

Units of three-fourths of an ounce or larger, are considered of normal size.

The units shall be considered uniform in size if the transverse diameter of any unit does not vary more than 25 per cent from the corresponding average diameter of the pieces of fruit in the container.

The fruit shall be considered tender when not less than 80 per cent of the units by count are completely perforated by a cylindrical rod, $\frac{5}{32}$ in. in diameter, under a load of 300 grams (approximately 10.6 oz.), applied vertically to the exposed, peeled surface of a test piece carefully fitted into an appropriate holder. In performing this test, the rod is placed on the exposed surface under an initial load of 100 grams and the load increased at a uniform, continuous rate of 12 grams per second until the piece is perforated. A convenient method of obtaining the test piece is as follows: Using a cylinder of approximately 1¼ in. diameter, made of sheet metal approximately $\frac{1}{32}$ in. thick, cut a core from the fruit completely through from the inner surface to the peeled surface, so that the peeled surface is exposed when the cylinder retaining this core is firmly supported on a horizontal, smooth plate. The fruit shall not, however, be so soft that the pieces in the can lose their natural shape when the container is opened and the product is carefully removed to a dish.

The fruit shall be considered peeled if 80 per cent or more of the pieces are free from skin, and no single piece carrying skin is less than 75 per cent peeled.

The fruit shall be considered unblemished if 80 per cent or more of the pieces in the container are free from scabs, bruises, frost bites, sunburn, hail injury, raggedness, green or brown colorations, red- or dark-streaked flesh, or other unsightly blemishes. The term "raggedness" means a frayed condition of the edges.

The fruit shall be considered as unbroken halves when 80 per cent or more of the units are unbroken and not excessively trimmed. Excessive trimming is defined as that amount which destroys the normal shape of the half.

The weight of the fruit in the containe means the fruit material in both the solid and liquid components. It is thus equivalent to the "put-in weight."

EXCEPTIONS

Canned peaches which fail to meet the above standard only in that they consist of peaches packed in water, need not bear the low quality legend if labeled "water-pack peaches."

Canned peaches which fail to meet the above standard only in that they consist of peeled, whole peaches, need not bear the low quality legend if labeled "whole peaches," even though the units may fail to meet the requirement for normal size.

Canned peaches which fail to meet the above standard only in that they are uniformly quartered, need not bear the low quality legend if labeled "quartered peaches," even though the units may fail to meet the requirement for normal size.

Canned peaches which fail to meet the above standard only in that they consist of peeled, whole peaches, need not bear the low quality legend if labeled "sliced peaches." In such cases, the requirement of not less than three-fourths of an ounce in weight for each unit shall be changed to not less than 1/10 oz. for each unit. In determining tenderness in sliced peaches, when the units are not sufficiently large to admit the obtaining of a test piece in the manner above suggested, a V-shaped metal trough, 1 in. long, ¾ in. wide, and ¾ in. deep, with vertical ends, is a convenient holder.

Canned peaches which fail to meet the above standard only in that they are white in color, need not bear the low quality legend if labeled "white peaches."

Canned peaches of a type where a frayed condition of the edges is a normal characteristic, for example, freestone peaches, need not bear the low quality legend because of raggedness alone if labeled to show the particular type to which they belong.

Preservers Request Legal Standards; Work for Freight Rate Reduction

By Paul Wooton
Washington Correspondent

ACTING on instructions received from the convention of the National Preservers' Association in Chicago, a delegation of preserve manufacturers called upon food control officials of the Department of Agriculture on Feb. 9 to urge the establishment of standards for preserves and jellies under the new Mapes Act. The delegation was headed by Senator Townsend, of Delaware, and Representative Reed, of New York, both of whom are active in advancing the interests of the fruit growers of their states.

Daniel R. Forbes, counsel for the association, has submitted a brief presenting the argument in support of the preserve manufacturers' claim that the Mapes Act applies to preserves, jams, and jellies as well as canned goods.

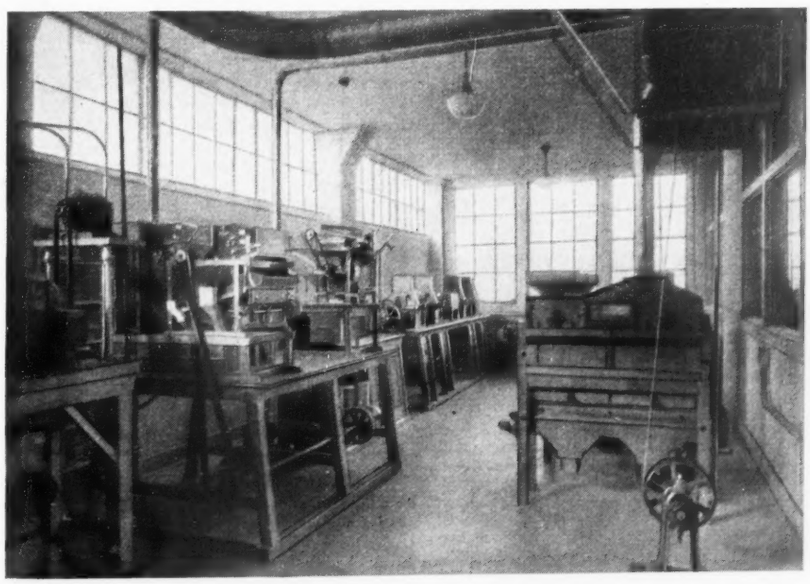
It is by invoking the Mapes Act that the preserve manufacturers hope finally to accomplish the object sought in the defunct Reed bill for the establishment of statutory standards for preserves, jams, and jellies, with a provision for labeling all products "imitation" which do not conform to the standards. The preserve manufacturers are confident that the Department of Agriculture will be able to establish definitive standards for their products that will meet the practical considerations which must be taken into account in the enforcement of the Mapes Act. Mr. Forbes points out that the ratio of sugar to fruit is the primary factor which affects the quality of preserves.

As the preserve manufacturers regard Secretary of Agriculture Hyde's ruling which permits the use of corn sugar in jams, jellies, and preserves without label declaration as extending to them an empty privilege, the association in convention decided that it would be both foolish and futile to request Secretary Hyde either to rescind or modify this ruling. Laboratory experiments conducted by the association indicate that corn sugar in excess of 25 per cent of total sugars cannot be used in preserves without affecting their quality.

A study of the distribution of jams and jellies on which R. S. Hollingshead, of the Foodstuff Division, Department of Commerce, made a report to the convention on Jan. 20 reveals that the demand for strawberry and raspberry preserves is out of all proportion to the demand for other fruit preserves. The lesson that this survey has taught is that the industry has been very shortsighted in concentrating its production on these two fruits when others which could be produced at a lower cost would find equal favor with the public with a little appropriate merchandising.

An increase in the quantity of fruit packed in glass is expected if the Interstate Commerce Commission finally approves a reduction in less-than-carload freight ratings on such products. A change in classification representing a reduction ranging from 15 to 35 per cent in freight charges in official classification for Illinois territory was scheduled to become effective Feb. 4, but operation of the tariffs was suspended by the Commission. There are no protests of record but it is understood that Western roads fear that if the reduction is made in Eastern territory, strong pressure will be brought to bear to apply the lower rates in the West. At a hearing on March 3, before Interstate Commerce Commission Examiner Hill in Washington, Mr. Forbes, as counsel for the preservers' association, is expected to contend that goods packed in tin and glass should be on a parity.

New Unit Installed for Flour Tests



A complete testing laboratory has been set up by Commander-Larabee Corporation, Minneapolis, Minn., for work on wheat, flour, and bakery products. Shown above is the new milling unit, used in selection of raw material and determining mill blends.

Liquid Sugar Imports May Wreck Tariff Intent

BREAKDOWN of the entire rate structure and intent of the present tariff on sugar is a possibility, and not necessarily a far-fetched one, as a result of a peculiar defect of the 1930 law that will be brought before the U. S. Customs Court in New York on March 27. Cuban raw sugar pays a duty of 2c. per pound. Mixtures of sugar and water testing from 50 to 75 deg. sucrose by the polariscope are dutiable at a rate of 1.7125c. per pound, plus 0.375c. for each degree above 75. But no provision was made in the law for mixtures testing below 50 degrees.

According to the Savannah Sugar Refining Corporation, one of the importers who took advantage of this loophole when it first came to light, such a product falls under the "sugar syrup" classification, with a duty of but ¼c. per gallon. If it is not to be so classified, the refining company claims, then it must be subject to a duty of 20 per cent *ad valorem* as "articles manufactured in whole or in part, not specially provided for."

The Commissioner of Customs has made a ruling that although the liquid could not be taxed at 2c. a pound as sugar, it is "in essence" a sugar, despite its low polariscopic test (approximately 48 sugar degrees) and is dutiable, therefore, at the rate of 1.7125c. a pound on mixtures of sugar and water, testing from 50 to 75 sugar degrees.

Not confident of victory in the customs court, the Treasury Department has sponsored a bill in Congress that would make all mixtures of sugar and water dutiable at 2.12c. per pound on the sugar content, which is the rate applicable to Cuban refined sugar testing 100 deg. The Treasury has not pushed this measure in Congress, however, because of its apprehension regarding the outcome of its case in the courts.

Practical politics offers an even more compelling reason against attempting to amend the sugar schedule at this session. Democratic leaders have given assurance that they will not oppose an amendment to prevent what is tantamount to the transfer of raw sugar to the free list, but they will not promise that if the tariff is opened for amendment they will not propose other changes in the law.

TRADE NOTES

ANDRUS-SCOFIELD COMPANY, manufacturer of coffee, peanut butter, and other specialties, Columbus, Ohio, has purchased the E. S. CLONINGER COMPANY, of that city. The Cloninger Company manufactures soda-fountain supplies, including crushed fruits, syrups, and the like. E. S. Cloninger has charge of the new department of the Andrus-Scofield Company, which will continue this line of business.

BORDEN FARM PRODUCTS COMPANY, New York City, will begin distribution of orange juice in the metropolitan area of New York about the middle of March, it was stated by officials of the company a few weeks ago. The juice will be frozen in one-half pint Sealcone containers, and shipped north from Florida for distribution by the company's house delivery system similar to milk.

BORDEN FARM PRODUCTS COMPANY recently acquired the plant of the Producers' Ice Cream Company at 28th Street and San Pablo Ave., Oakland, Calif. It is planned to treble the size of the present plant.

CALIFORNIA PRESERVING COMPANY, INC., New York City, distributor of canned foods and preserves, has been ordered by the Federal Trade Commission to cease using the word "Preserving" as part of its name unless it own, operate, or actually control a plant in which such packing and preserving is done.

CAMPBELL SOUP COMPANY, Camden, N. J., is now sponsoring the most extensive radio broadcast program given to food products. A half hour of music is presented from 9:15 to 9:45 (Eastern Standard Time) each week-day morning.

GENERAL FOODS CORPORATION, New York City, recently announced acquisition of the Dunlop Milling Company, Clarksville, Tenn. The Dunlop organization is one of the oldest milling companies in the territory it serves, having been in operation for approximately 50 years. It manufactures a general line of milling products, with a capacity estimated at 1,200 barrels of flour per day. Heretofore the principal milling products of General Foods have been its Swans Down Cake Flour, graham flour, and various byproducts produced in the manufacture of these and of cereal products at Battle Creek, Mich.

GIBSON CANNING COMPANY, Gibson City, Ill., is expanding its activities in central Illinois territory, having recently taken over the Bloomington Canning Company, with four canneries in the heart of the corn belt, located at Bloomington, El Paso, Chenoa, and LeRoy, Ill. The Gibson organization has also purchased the plant of the Iroquois Canning Company, of Onarga, Ill. The addition will give the Gibson plant a production of 1,000,000 cases of sweet corn annually, it is said.

HOME BAKING COMPANY, Milwaukee, Wis., recently incorporated for $100,000, will start operations next month in a plant with a capacity of 60,000 loaves of bread daily. C. E. Wernig is president and James D. Godfrey vice-president.

ILLINOIS CANDY COMPANY, Chicago, Ill., has been organized with a capitalization of $20,000. Officials of the Walter O. Birk Candy Company, Chicago, Ill., formed the new organization.

MICHIGAN ALKALI COMPANY, Chicago, Ill., and its associate, Mathieson Alkali Works, Inc., New York City, have begun the manufacture of solid carbon dioxide under the Carba process.

NATIONAL JUICE COMPANY, Tampa, Fla., a subsidiary of the National Dairy Products Corporation, is planning to produce a total of 1,000,000 gal. of frozen orange juice to be used for the test sales campaigns in eight key cities of the country.

DR. PEPPER BEVERAGE COMPANY, Dallas, Texas, has begun an expansion program that will involve the erection of new plants in Asheville, Charlotte, Winston-Salem, Durham, and Wilmington, N. C.

PROCTER & GAMBLE COMPANY, Cincinnati, Ohio, announced on Feb. 13 that $984,562 in profit-sharing dividends would be distributed to employees of the company. This dividend, it was announced, is the largest ever paid to employees as their share of the organization's profits.

RAISIN BROOK PACKING COMPANY OF ILLINOIS has been organized to carry on the business of breeding, raising, and packing rabbits. A group of five buildings will adjoin the Lincoln Highway, near Chicago. In addition to killing, freezing, and packing rooms, and a building for pelt curing and drying, there will be a restaurant specializing in rabbit meat products.

SEARS, ROEBUCK & COMPANY, Chicago mail order house, has added oranges, tangerines, and grapefruit to the stock of its Miami store and will ship them by mail on order to all parts of the country, it was recently announced.

SOUTHLAND PECAN COMPANY, Columbus, Ga., has recently acquired the Hardaway syrup plant, in which it will expand its operations in the canning of vacuum packed pecans.

THE GENERAL AMERICAN TANK CAR CORPORATION has completed negotiations involving the acquisition of 6,000 refrigerator, tank and stock cars, comprising the entire fleet owned by Swift & Company, whose shipments amount to about 200,000 carloads each year. Swift & Company has operated its own car department since the company was organized and this is the first instance of a large packer transfering that phase of its business to an outside concern. The packers will retain the cars in their service under a long-term lease from the car corporation.

Back Issues Obtainable

In the past we have had to decline orders for complete sets of FOOD INDUSTRIES from its origin. Recently, however, we have come into possession of two complete sets which are for sale unbound for $4 each. We also have a few extra copies of the early numbers of FOOD INDUSTRIES which can be obtained for 40c. each by those who desire to complete their sets. Since the supply is limited, prompt action is desirable.

—The Editors.

PERSONALS

LAWRENCE W. BASS, for the past two years a member of the executive staff of Mellon Institute of Industrial Research, Pittsburgh, Pa., resigned on Feb. 1 to become assistant director of

research of the Borden Company, New York City. Prior to his work with the Mellon Institute, Dr. Bass was an associate in the division of chemistry of the Rockefeller Institute for Medical Research.

CHARLES J. BINNEY has been named assistant sales manager in charge of the Eastern States for the Sun-Maid Raisin Growers' Association. He takes the place of HARLEY B. LEWIS, who was recently made sales manager. For several years Mr. Binney has been in charge of the Canadian business of the raisin growers' association.

P. E. BRUCE, in charge of the Peoria (Ill.) division of the Kroger Grocery & Baking Company for the last ten months, has been placed at the head of the Cleveland division. A. J. SCHILINKERT, former director in Cleveland, has been transferred to the general offices in Cincinnati.

STANLEY CARLYLE, formerly production manager of the Milford Canning Company, Milford, Ill., has recently resigned and purchased a substantial

interest in the Princeville Canning Company, Princeville, Ill.

LEONARD H. CRETCHER has been appointed assistant director of the Mellon Institute of Industrial Research, Pittsburgh, Pa. Dr. Cretcher, who has headed the Institute department of research in pure chemistry since 1929, is best known for his published work in the domain of sugar chemistry.

SIDNEY F. DAVIS, of the Owens-Illinois Glass Company, Toledo, Ohio, has been transferred to the Cincinnati office, where he will have charge of the Louisville (Ky.), area.

HARRY H. DOBRY has resigned as vice-president and director of the Blazek Cold Storage Door Company.

KARL E. HUMPHREY, formerly president of the Oklahoma units of General Mills, Inc., has been elected treasurer of the corporation, it was announced a few weeks ago. T. C. THATCHER succeeds Mr. Humphrey as president of the Oklahoma company. D. D. Davis, who has been vice-president and treasurer since the formation of General Mills in 1928, will continue to serve as vice-president.

JAMES A. KING, of the Nulomoline Company, manufacturer and distributor of invertase and invert sugar products, has been appointed sales manager, it was announced on Feb. 24. Mr. King has been connected with the organization for more than twelve years.

JULIAN M. LIVINGSTON has been elected vice-president and general manager of the Ward Baking Corporation, it was announced on Feb. 6. Mr. Livingston was formerly head of the Livingston Baking Company, recently acquired by the Continental Baking Company.

C. S. MCKELLOGG, of Willard, Ohio, has been appointed food and drug inspector in the U. S. Department of Agriculture. He will be assigned to the Cincinnati office to cover Ohio, Kentucky, Tennessee, and Indiana.

JOSEPH A. MENDEL has been made Savannah (Ga.) manager for Armour & Company, succeeding F. O. MILLER, who has been transferred to Atlanta. HARRY J. BAKER, manager of the Savannah beef department of the company, has retired after 31 years of service. He is succeeded by W. H. COTTER.

O. W. MILLER, formerly in charge of cake production at the Campbell-Taggert Bakeries, Inc., Kansas City, Mo., has been made president and general manager of the Lee Baking Company at Atlanta, Ga., a unit in the Campbell-Taggert organization.

JAMES H. POST, of the National Sugar Refining Company, New York City, was elected president of the Sugar Institute at the annual meeting a few weeks ago. W. H. HOODLESS, of the Pennsylvania Sugar Company, Philadelphia, Pa., was elected chairman of the board.

ANDREW RYAN has been named directing head of the recently established Kroger Food Foundation, which will function as an independent testing laboratory for all food products, it was announced by Albert H. Morrill, president of the Kroger Grocery & Baking Company, on Feb. 14. Dr. Ryan has an extended record in scientific research in nutrition. He has been a member of the faculty of Tufts College, Boston; University of Maryland, University of Alabama, and others, serving in the department of research and food chemistry. He has also been lecturer at the Graduate School of Yale University.

THOMAS L. SMITH has been elected first vice-president of Standard Brands, Inc., it was announced on Feb. 9. Mr. Smith began his business career as a

grocery clerk in Troy, N. Y. In 1894 he joined the Fleischmann Company as a wagon salesman. When Standard Brands was created in 1929, Mr. Smith had become a director and vice-president of the Fleischmann Company, as well as its general sales manager. He entered the Standard Brands organization as a vice-president and general sales manager at that time.

R. C. SHERWOOD, who was formerly director of the Minnesota State Testing Mill, is now assistant director of research for General Mills, Inc., Minneapolis, Minn. H. O. HALVORSON has succeeded Dr. Sherwood as director of the state mill.

EPHRAIM TOMLINSON, president of the Camden (N. J.) Safe Deposit & Trust Company, has been elected a director of Campbell Soup Company. The trust company is trustee and executor of $150,000,000 estate left by Dr. John T. Dorrance, late president of the Campbell Soup Company.

F. W. WEBB, formerly president of the Mashburn Drug Company, of Valdosta, Ga., recently joined McCormick & Company, Inc., Baltimore, Md., spice and extract manufacturers.

M. T. ZAROTSCHENZEFF, inventor of the "Z" brine fog process for quick-freezing, is planning to leave for the United States from England on April 4. He will negotiate with several American firms interested in the process.

OBITUARY

HENRY OGLE BELL IRVING, dean of the salmon canning industry in British Columbia, died in Vancouver, B. C., Feb. 19, at the age of 74. Beginning his career as a civil engineer, Mr. Bell Irving entered the salmon canning industry in 1890, the firm which he founded securing canneries in Alaska and Washington, as well as in British Columbia.

JOSEPH M. W. KITCHEN, an authority on milk distribution and the inventor of several appliances for sanitary production and bottling, died on Feb. 3, at his home in East Orange, N. J. He was 84 years old and had been ill for some time.

E. S. LAMBERTON, assistant treasurer of the National Sugar Refining Company of New Jersey, died at Westfield, N. J., recently. He was 88 years old and was believed to have been the oldest man actively engaged in the sugar industry.

ARTHUR LOWENSTEIN, a former vice-president of Wilson & Company, Chicago meat packers, was killed on Feb. 12 when he fell 11 stories from the roof of the North Loop Motoramp Garage, Chicago, Ill., of which he was president. Dr. Lowenstein, who was 49 years of age, had been chairman of the committee on scientific research for the Institute of American Meat Packers. In 1923 he became vice-president of the Calumet Fertilizer Company.

ARTHUR SMART PITTS, manager of the Salt Lake City branch of the American Packing company, died in Salt Lake City Feb. 8, following a heart attack. Mr. Pitts had been identified with the meat industry in Utah for 40 years, and had been associated with the American Packing company for the past 15 years.

NATHANIEL J. L. RYDER, whose long connection with the packing industry had won him four years ago the 50-year emblem and medal of the American Institute of Meat Packers, died on Jan. 30 at West Medford, Mass. He was 73 years old. He was connected with the firm of Batchelder, Snyder, Dorr & Doe of Boston, Mass., at the time of his death.

JOHN H. THOMPSON, manager of the raw sugar department of the American Sugar Refining Company, New York City, with which he had been connected for 50 years, died in Brooklyn on Feb. 20. He was 82 years of age.

JOHN A. WOODWARD, pioneer meat packer of Los Angeles, Calif., one of the organizers of the Woodward-Bennett Packing Company, 35 years ago, died Jan. 31 at his home in Los Angeles. He was 72 years old. Mr. Woodward was known for many years as the largest sheep raiser in the Southwest. Because of the long drive to shipping points, he decided to increase the market for cattle and sheep in southern California by organizing the packing company. Although he retired and sold out his interest four years ago, the company still bears its original name.

NEW CONSTRUCTION

Bakery—J. T. Camlet, 26 Piaget Ave., Clifton, N. J., will receive bids about Mar. 1, for the construction of a 2 story bakery, etc. including bakers ovens, mixing machines, etc. at Mercer St. and Wallington Ave., Wallington, for J. Borbuta, 103 Halstead St., Wallington. Estimated cost $40,000.

Bakery — Classen Sons, 2365 Silvers St., Ridgewood, N. Y., plans the construction of a bakery on Hughes St. Estimated cost $50,000.

Bakery — Dept. of Correction, State Capitol, Albany, N. Y., will soon award contract for the construction of a bakery building, kitchen equipment, bakery oven, etc. at Attica State Prison, Attica.

Bakery—El Fenix Baking Co., c/o J. Estrada, 110 South Laredo St., San Antonio, Tex., plans extensions and improvements to bakery including new ovens, power equipment, conveyors, etc. Estimated cost $100,000. Private plans.

Bakery—Fehr Baking Co., 4104 Leeland St., Houston, Tex., is having plans prepared for the construction of a bakery at Laurel Ave. and 11th St., Beaumont. Estimated cost $50,000. C. J. Patterson, 4050 Penn St., Kansas City, Mo., is engineer. Work will be done by owner's forces.

Bakery—G. W. Opell Co., Vincennes, Ind., awarded contract for the construction of a bakery at 1910 North Indiana St. Estimated cost $42,000. Sutton & Routt, Vincennes, archt. Work will be done by separate contracts.

Bakery—Owner, c/o H. G. Bach, 63 Schureman St., New Brunswick, N. J., is having plans prepared for a 2 story bakery plant including ovens, mixing machinery, etc., on Livingston Ave. Estimated cost $40,000.

Bakery Addition—Kern's Bakery, 448 North Point St., Stockton, Calif., awarded contract for addition to bakery on North Point St., to L. S. Peletz, 1660 West Acacia St., Stockton. Estimated cost $40,000.

Bottling Plant — Coca Cola Bottling Works, 1334 South Central Ave., Los Angeles, Calif., awarded contract for a 2 story, 72 x 150 ft. factory to W. P. Neil Co., 4814 Loma Vista St., Los Angeles.

Bottling Plant—Coca Cola Bottling Works, 20 Roberts St., Bradford, Pa., is receiving bids for a 1 and 2 story, 75 x 100 ft. bottling plant. Private plans.

Bottling Plant—F. & M. Schaefer Brewing Co., Kent Ave. and 10th St., Brooklyn, N. Y., plans addition and alterations to bottling plant. Estimated cost $100,000. Waldemar Martensen, 103 Park Ave., New York, is architect.

Candy Factory—Davenport Candy Co., 211 East 2nd St., Davenport, Ia., is having preliminary plans prepared for a 1 story, 60 x 200 ft. candy factory on Boise Ave. Estimated cost $40,000. H. S. Muesse, 925 American Bank Bldg., Davenport, is architect.

Candy Factory—Moira Ltd., Halifax, N. S., plans additional unit to candy factory. Estimated cost $150,000.

Canning Plant—Marshall Canning Co., South 3rd Ave., Marshalltown, Ia., had plans prepared for a 2 story, 45 x 135 ft. canning plant at Rowland. $15,000. H. E. Reimer, 129 East Main St., Marshalltown, is architect, also awarded contract for a 1 story, 52 x 67 ft. warehouse at Marshalltown to Glans Construction Co., Marshalltown.

Canning Plant (Fruit and Vegetable) — Farmersville Cannery Co., M. A. Jones, Secy., Farmersville, Tex., is having preliminary plans prepared for the construction of a fruit and vegetable canning plant.

Canning Plant (Vegetable and Fruit) — Nacogdoches Fruit Growers Association, c/o R. Cox, Pres., Nacogdoches, Tex., is having preliminary plans prepared for a vegetable and fruit canning plant. Estimated cost $35,000.

Cannery and Cold Storage Plant—Washington Canners Co-Operative Association, Vancouver, Wash., will receive bids about Mar. 15 for the construction of a 1 story, 100 x 100 and 80 x 370 ft. cannery and cold storage plant. Estimated cost $75,000. Sutton & Whitney, Lewis Bldg., Portland, Ore., are architects. Machinery and equipment including boilers, engines, motors, cannery and cold storage equipment will be required.

Creamery Plant—Equity Union Creamery Co., J. Hammer, Mgr., Mitchell, S. D., had plans prepared for a 1 story, 75 x 92 ft. creamery plant including refrigeration equipment, etc. Estimated cost $65,000. F. W. Kings, Mitchell, is architect.

Dairy Plant — Bendora Farms, 18 Prospect St., Morristown, N. J., plans the construction of a dairy plant. Estimated cost $40,000. Architect not selected.

Dairy Plant—R. C. Cenck, Gary, Ind., had plans prepared for a 2 story, 45 x 60 ft. dairy plant at 17 West 23rd St. Estimated cost $42,000. Private plans.

Dairy Plant—Corliss Creamery Co., 1762 West Carson St., Pittsburgh, Pa., awarded contract for the construction of a 2 story, 98 x 160 ft. dairy plant at 1228 Reedale St. to Schultz, Schreiner & Clyde, May Bldg., Pittsburgh.

Dairy Plant — Roberts Sanitary Dairy Co., D. E. Roberts, Gen. Mgr., 809 Douglas St., Sioux City, Ia., will receive bids about Mar. 1, for a 1 and 2 story 50 x 160 and 160 x 175 ft. dairy plant at West 14th and Omaha Sts. Estimated cost $150,000. G. B. Hilters, 2614 Jennings St., Sioux City, is architect.

Dairy Plant—Summe Dairy Co., c/o A. J. Summe, 4115 East 27th St., Kansas City, Kan., awarded contract for a 2 story dairy plant at 15th and Benton Sts. to Collins Construction Co., 703 Davidson Bldg., Kansas City.

Milk Plant — Douthitt Engineering Co., 221 North La Salle St., Chicago, Ill., (designers and builders of dairy plants, creameries, etc.) plan the construction of a milk plant at Shawnee, Okla. Estimated cost $150,000. Lessee not announced.

Milk Distribution Plant—Sheffield Farms Co. Inc., 524 West 57th St., New York, N. Y., will soon award contract for a 1 story addition to milk distribution plant on Ocean Ave., Jersey City. Estimated cost $150,000. F. A. Rooke, 12 East 41st St., New York, is architect.

Cold Storage Warehouse—Wilson Packing Co., U. S. Yards, Chicago, Ill., plans the construction of a 2 story, 75 x 150 ft. cold storage warehouse at Crockett and Jefferson Sts., Beaumont, Tex. Estimated cost $85,000.

Ice Manufacturing Plant—Carlstadt Consumers Ice Co., 501 11th St., Carlstadt, N. J. (br. of Rutherford), awarded contract for remodeling ice manufacturing plant to Frick & Co., Waynesboro, Pa. Estimated cost $40,000.

Ice Plant—Central Power & Light Co., National Bank of Commerce Bldg., San Antonio, Tex., is having plans prepared for the construction of a 45 ton ice plant at Rio Grande City, $40,000; also plans extensions and improvements to ice and cold storage plant at Eagle Lake. Private plans.

Ice Plant—City of Ryan, Okla., is having preliminary plans prepared for the construction of a 15 ton raw water ice plant. Estimated cost $30,000. Engineer not announced.

Ice Plant — City of Wichita Falls, Tex., is having preliminary plans prepared for the construction of an ice plant. Estimated cost $25,000.

Ice Plant—J. O. Hamilton, Las Cruce, New Mexico & Associates, plan the construction of a dry ice plant at El Paso, Tex. Estimated cost $50,000. Private plans.

Ice Plant—E. A. Liebman, 1214 West 18th St., Oklahoma City, Okla., is having preliminary plans prepared for the construction of a 100 ton raw water ice plant at Klein and Reno Sts. Estimated cost $100,000. Private plans.

Ice Plant—Mongiello Bros., 625 Communipaw Ave., Jersey City, N. J., postponed construction of 1 story, 100 x 100 ft. ice plant, $50,000. C. H. Ziegler, 26 Journal Sq., Jersey City, Archt. Indefinite when project will mature.

Ice Plant — Quix-Kold Corp., C. C. Beasley, Pres., Oklahoma Savings Bank Bldg., Oklahoma City, Okla., is having preliminary plans prepared for a plant for the manufacture of dry ice at Fort Smith, Ark. Private plans. Also awarded contract for a 51 x 100 ft. plant at Norman, Okla. $45,000. Equipment contracts let.

Ice Plant — Supreme Coal & Ice Co., 551 Nostrand Ave., Brooklyn, N. Y., awarded contract for an ice plant at Lexington Ave. and Marcy Pl. to Oforu Inc., St. Marks Ave., Brooklyn.

Pre-Cooling Plant—Olive Heights Citrus Association, Olive, Calif., awarded contract for a 2 story pre-cooling plant to York Ice Machinery Co., 5051 Santa Fe Ave., Los Angeles, $74,500.

Pre-Cooling Plant—Orange-Mutual Citrus Association, Orange, Calif., is having plans prepared for the construction of a 2 story, 90 x 110 ft. pre-cooling plant. Estimated cost $80,000. J. V. Vrybaugh, 505 Burch St., Santa Ana, is architect.

Pre-Cooling Plant—Tustin Hills Citrus Association, Tustin, Calif., awarded contract for the construction of a pre-cooling plant to J. W. Markel & Sons, Builders' Exchange Bldg., Santa Ana. Estimated cost $90,000. Pre-cooling system let to York Ice Machinery Co., 5051 Santa Fe Ave., Los Angeles.

Refrigeration Warehouse and Distribution Plant—Swift & Co., Packers and Exchange Aves., Chicago, Ill., are receiving bids for the construction of a refrigeration warehouse and distribution plant at Charlotte, N. C. Estimated cost to exceed $40,000. Private plans.

Fruit Exchange Building—Pennsylvania R.R., Broad St. Station, Philadelphia, Pa., awarded contract for the construction of a 1 and 2 story, 72 x 660 ft. fruit exchange building at Mount Vernon yards to M. A. Long Co., 10 West Chase St., Baltimore, Md. Estimated cost $650,000.

Fruit Storage Building—Chicago, Milwaukee, St. Paul & Pacific Ry. Co., Washington Ave. and Third Ave. S., Minneapolis, Minn., awarded contract for a 1 story fruit storage building at 9th Ave. S. and Second St. to Pike & Cook, 416 South 5th St., Minneapolis. Estimated cost $100,000.

Fruit Warehouse — Vermont Fruit Co., c/o B. J. Fayette, 210 Battery St., Burlington, Vt., plans to rebuild fruit warehouse on Battery St. Private plans. Work will be done by owner's forces.

Grain Elevator—American Elevator Co., ft. of Childs Sts., Buffalo, N. Y., awarded contract for the construction of a grain elevator, 1,500,000 bu. capacity to Monarch Engineering Co., Buffalo. Estimated cost $300,000.

Grain Elevator—Burrus Milling Co., Amarillo, Tex., has work under way on the construction of a grain elevator, 1,000,000 bu. capacity, by owner's forces. Estimated cost $250,000. Contract let for excavation to J. S. McKnight, 108 Taylor St., Amarillo.

Grain Elevator — Canada Malting Co. Ltd., 5022 St. Ambroise St., Montreal, Que., will soon award contract for the construction of a grain elevator, 600,000 bu. capacity. J. S. Metcalf Co., 460 St. Helen St., Montreal, is architect.

Grain Elevator — J. Donahue, Ponca City, Okla., is having preliminary plans prepared for the construction of a new grain elevator at Ralston, Okla. Estimated cost $25,000. Private plans.

Grain Elevator—Farmers Union Co-Operative Grain Association of South Dakota, J. S. Atkins, Pres., Wessington Springs, S. D., is having preliminary plans prepared for the construction of a grain elevator, 500,000 bu. capacity at Sioux City, Ia. Estimated cost $75,000.

Grain Elevator—Great Northern Ry. Co., St. Paul, Minn., is having preliminary plans prepared for the construction of a grain elevator, at Sioux City, Ia. Estimated cost $500,000. J. R. W. Davis, St. Paul, is chief engineer.

Grain Elevator—Missouri Pacific R.R. Co., 13th and Olive Sts., St. Louis, Mo., will receive bids about Mar. 1 for superstructure of a grain elevator, 2,500,000 bu. capacity at 4600 Gardner Ave., Kansas City. Estimated cost $1,000,000. E. A. Hadley, St. Louis, is chief engineer. Contracts for pile driving, excavation and foundation awarded. Continental Export Co., Merchants Exchange Bldg., St. Louis, is lessee.

Grain Elevator—C. E. Robinson Milling Co., 9th and North Sts., Salina, Kan., will soon receive bids for a grain elevator including conveyors, machinery, motors, etc. at Topeka. I. L. Zerbe, 140½ South Santa Fe Ave., Salina, is architect and structural engineer.

Rendering Plant—East St. Louis Rendering Co., National City, Ill., awarded contract for a 3 story, 40 x 75 ft. plant for the manufacture of hog and chicken feeds, including 10 x 36 ft. platform to J. I. Gedney, 1416 Hall St., East St. Louis. Estimated cost $60,000.

Abattoir—United Dressed Beef Co., 780 First Ave., New York, N. Y., plans the construction of a 2 story abattoir, slaughter sheds, etc., at Johnson Ave. and Bogart St. Estimated cost including equipment $30,000. Stadler Engineering Co., 140 Liberty St., New York, is architect and engineer.

Meat Storage Plant—Swift & Co., Sewall Ave., Asbury Park, N. J., will not construct 2 story addition to meat storage plant. Estimated cost $40,000. Project abandoned.

Packing Plant — Mupu Citrus Association, Santa Paula, Calif., awarded contract for the construction of a packing plant to Richards-Neustadt Construction Co., W. M. Garland Bldg., Los Angeles. Estimated cost $52,995.

Packing Plant Addition—Villa Park Orchards Association, Villa Park, Calif., is having plans prepared for a 1 story, 60 x 90 ft. addition to packing plant. H. A. Hamm, 2145 Sacramento St., Los Angeles, is engineer.

Refinery (Maple Sugar)—Les Producteurs de Sucre d'Erable de Quebec, C. Vaillancourt, Secy., 5 Begin Ave., Levis, here, awarded contract for the construction of a 5 story, 60 x 240 ft. maple sugar refinery at Valley Junction to J. Bolly, St. Georges de Beavee. Estimated cost $105,000.

Insulated! Air-Tight! Delivers for Swift

90 Miles from Chicago in 4 Hours!

SPEEDY and dependable, this General Motors Truck, the famed Model T-60, operates between the Chicago plant of Swift & Company and a thriving consumer center 90 miles distant.

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With its brilliant crimson finish, black striping and gold lettering, it is an exceptionally handsome truck. Attracting wide and favorable attention, it is considered a powerful advertisement.

This is one of a number of General Motors Trucks which are turning in remarkably fine performances for the great Swift organization. Modern high-speed trucks are being increasingly used by the company.

Purchasing agents and transportation executives will find it profitable to investigate the impressive records which General Motors Trucks are establishing in the packing industry.

For any hauling or delivery job you have, there is a modern 6-cylinder General Motors Truck accurately suited to it. It will handle the work with "made-to-order" efficiency and economy. *Investigate this great truck line!*

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PEPPERELL weaves sheets and pillow cases with utmost care...bleaches some snowy-white...tints others in delicate pastel shades...manufacturing operations that obviously can be conducted successfully only in plants well lighted, immaculately clean. Hence, Pepperell paints with Barreled Sunlight.

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Barreled Sunlight is smooth, dirt-resisting, washable as tile. Month after month, it keeps clean, white and bright. So smooth, so non-porous is it that no recesses catch and hold dirt.

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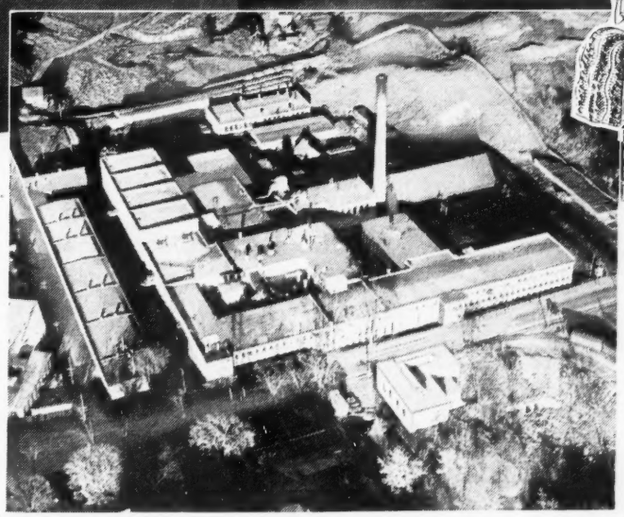

At left . . . air-view of the Pepperell Manufacturing Company's Lewiston, Me., Bleachery . . . painted throughout with Barreled Sunlight . . . as are also the Pepperell plants at Biddeford, Me., Lindale, Ga., Opelika, Ala., and Fall River, Mass.

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BARRELED SUNLIGHT, THE RICE PROCESS WHITE, is guaranteed to remain white longer than any oil gloss paint or enamel, domestic or foreign, applied under the same conditions.

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REFRIGERATION

with the Kelvinator Cross Fin Coil

Food manufacturers have found from experience that Kelvinator Cross Fin Coils deliver more refrigeration—*faster*—than other types.

The scientific design of the fins gives them the greatest amount of cooling area. And the soldering of each and every fin to the tube gives the maximum amount of heat conductivity and remarkable cooling efficiency.

The unit is completely automatic, with a defrosting cycle which prevents dehydration and drying out of foods.

With 45 Cooling Units and 30 Condensing Units, Kelvinator has the correct equipment for every refrigeration requirement.

Complete information regarding the Kelvinator Flooded and Dry System Cross Fin Coils and the full line of Kelvinator Compressors will be sent on request. Use the coupon below.

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Gentlemen: Please send information regarding ☐ Flooded System Cross Fin Coils ☐ Dry System Cross Fin Coils ☐ Kelvinator Compressors.

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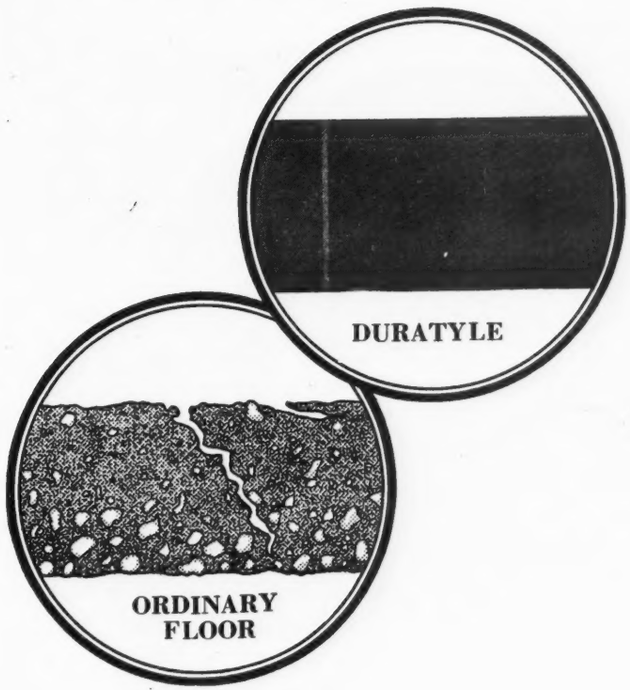

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DURATYLE Better Floors

Acids, even in weak solution, will penetrate ordinary porous flooring material and in a few years or even a few months time it will be full of acid holes and small cracks . . . then it begins to crumble and disintegration takes place rapidly.

This cannot occur in a Duratyle Floor. Duratyle is acid proof. The smooth, hard, non-porous surface of Duratyle is impervious to the many destructive agents ever present in all food products plants. The solid surface structure prevents acids from seeping through and eating at the under layer.

And this is one only of many advantages of Duratyle, the permanent flooring . . . the economical flooring. Let us tell you more about it.

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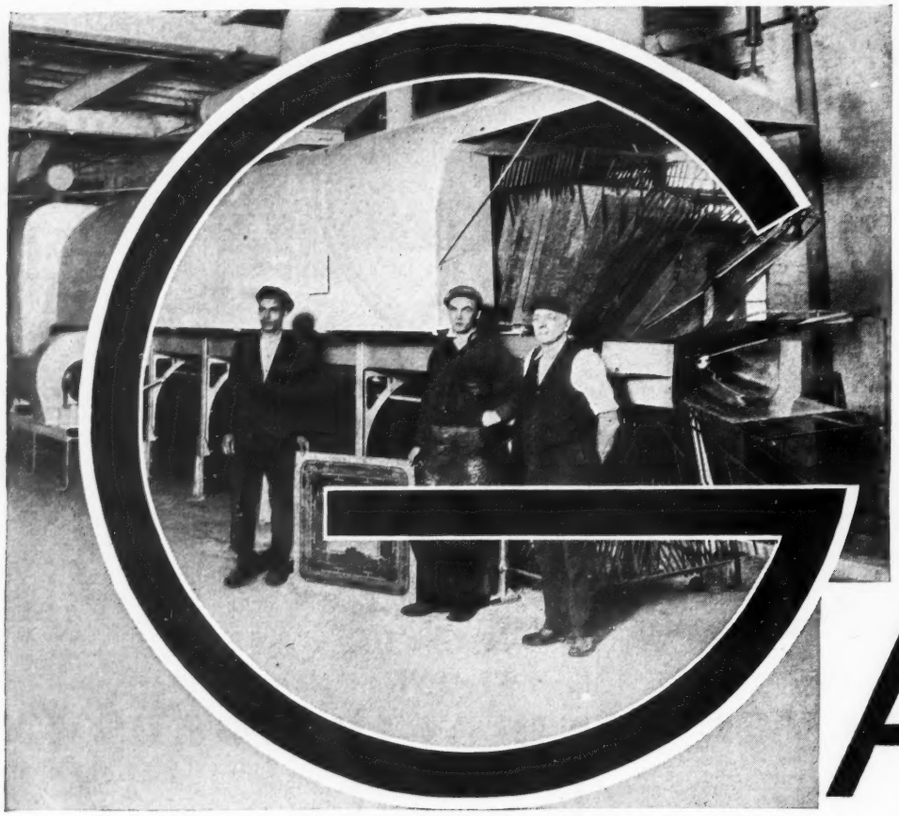

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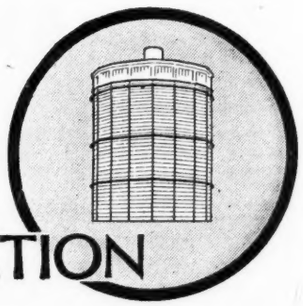

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AN OPEN LETTER

from an Executive in the Food Industry in New Orleans . . .

G. W. DUNBAR FOOD PRODUCTS CO., Inc.
CANNERS OF
HIGH GRADE FRUITS, VEGETABLES,
SYRUPS, MOLASSES, ETC.
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TO THE FOOD INDUSTRY:

I am an executive of a cannery in New Orleans. Business is good, and I believe that other food industries can profit here with us and make New Orleans one of the world's great food centers.

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Intelligent American labor work for us efficiently all year in a mild climate. Nine trunk railways speed our shipments to all the South. We have the edge on competition in freight rates to the east and west coasts. And Latin America is buying from us, making New Orleans its first source of supply.

Because of our progress, because we believe that other food industries coming here will profit with us, we suggest that you write for the "Survey of New Orleans Industrial Zone" an analysis of possibilities for you.

G. W. Dunbar Food Products Co., Inc.

NEW ORLEANS
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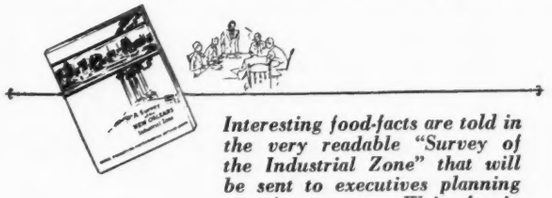
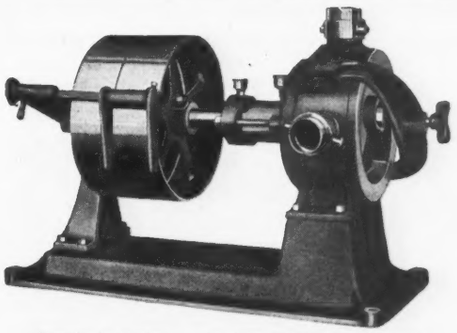


Interesting food-facts are told in the very readable "Survey of the Industrial Zone" that will be sent to executives planning now for progress. Write for it.



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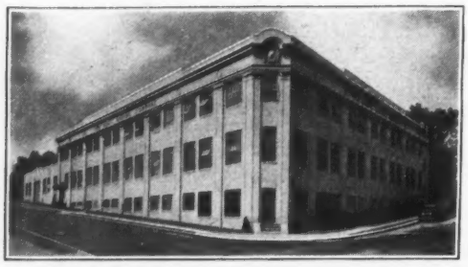

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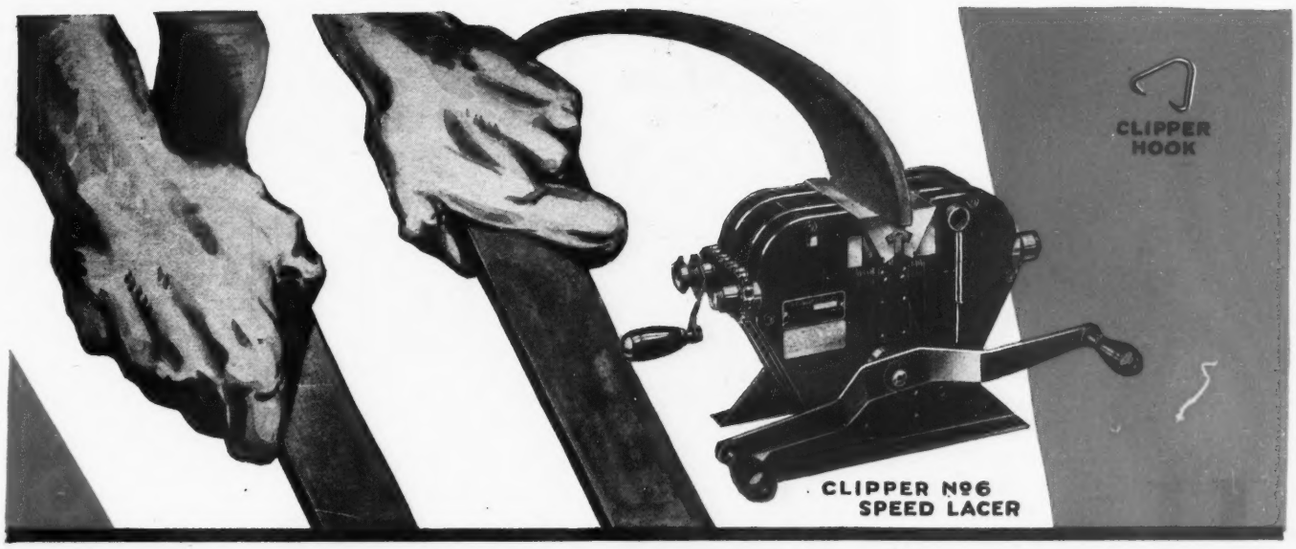

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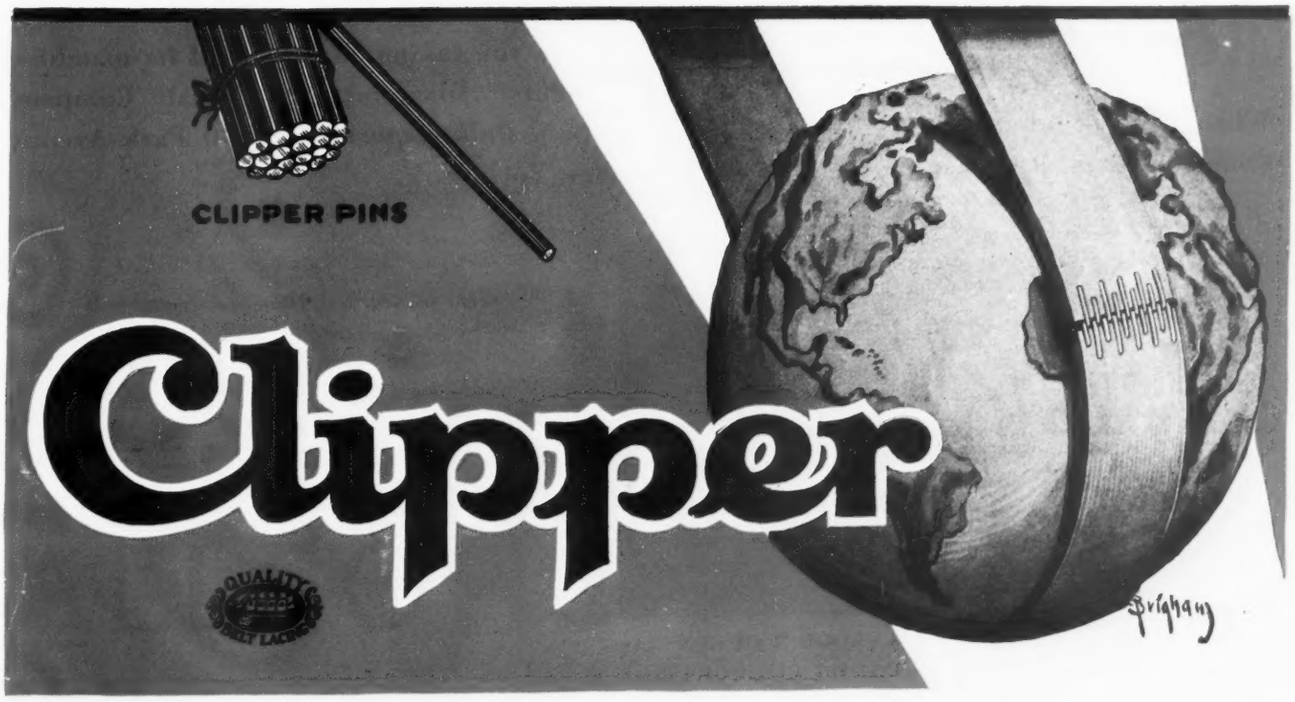

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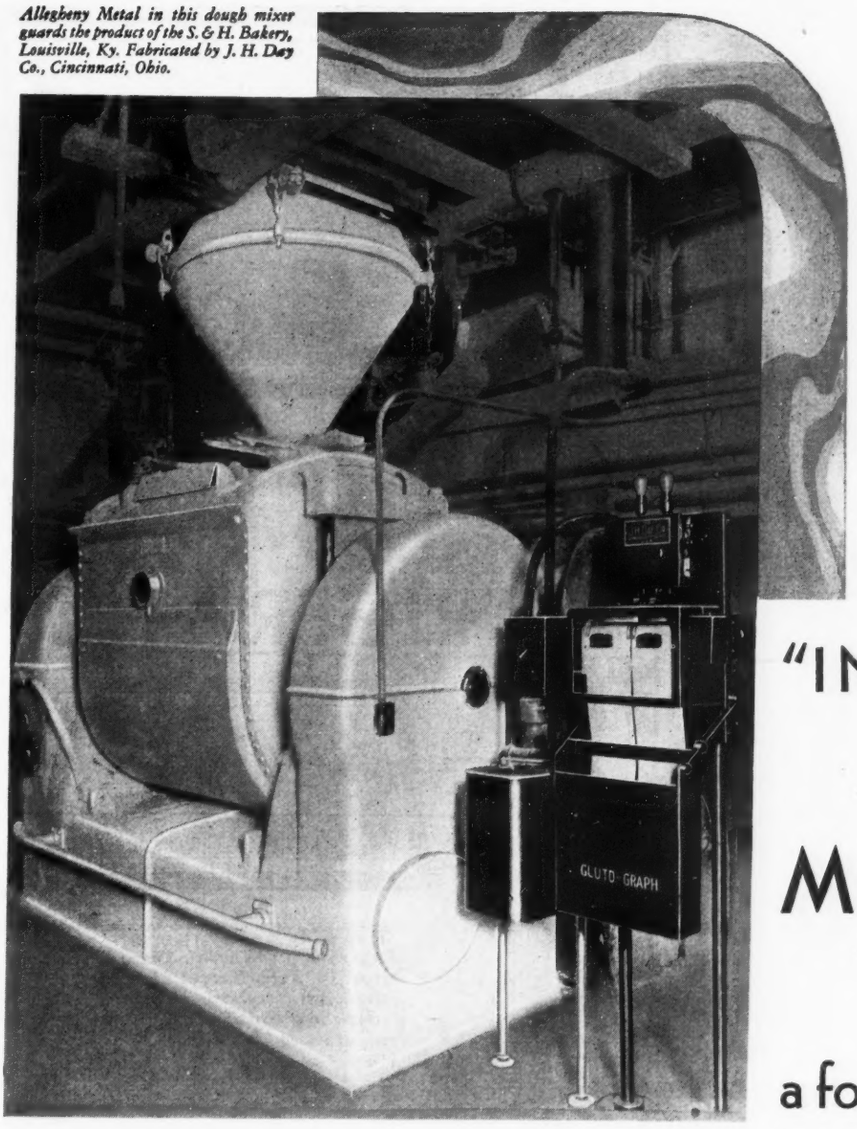

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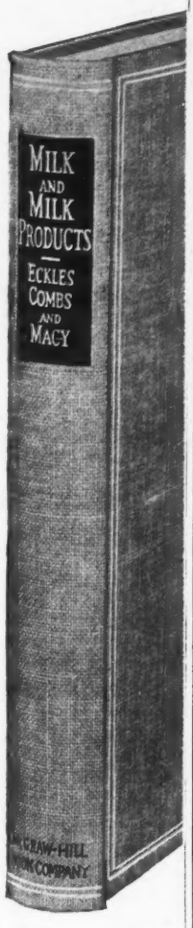

Milk and Milk Products

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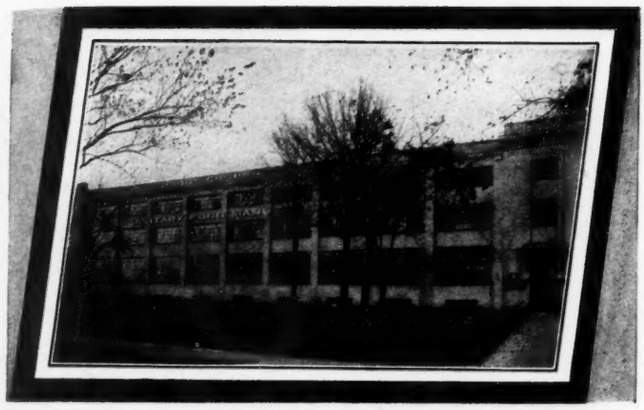

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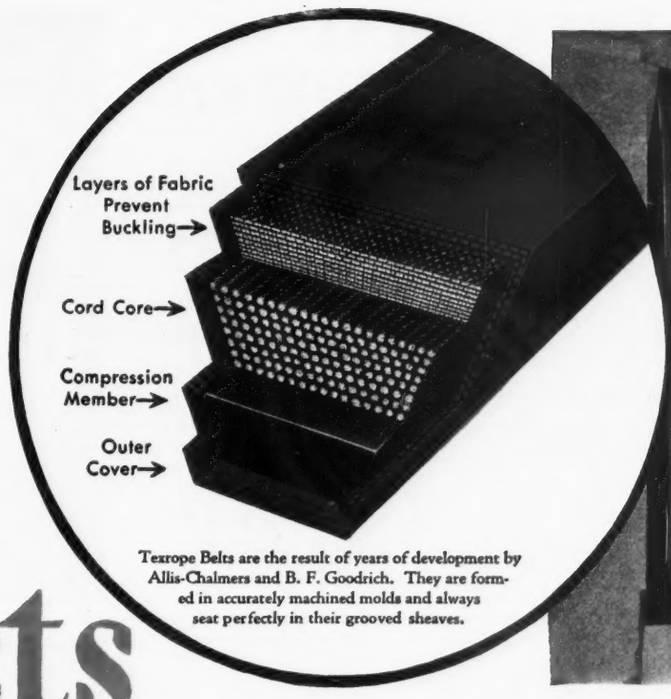
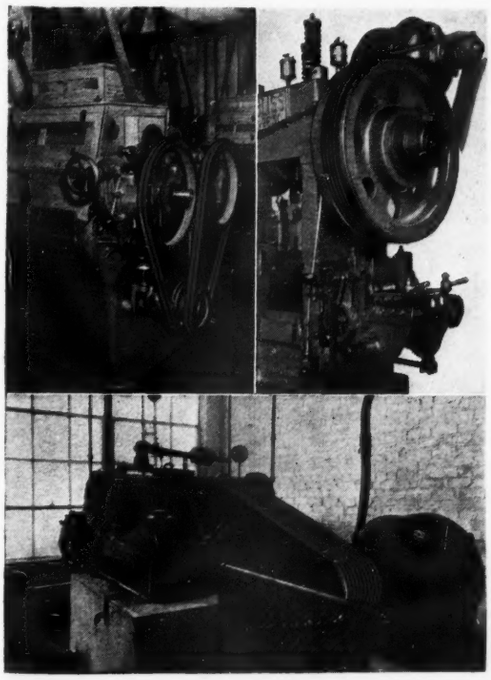
SINCE 1867

Bulletins and data or special reports are available on request.



Texrope Belts are the result of years of development by Allis-Chalmers and B. F. Goodrich. They are formed in accurately machined molds and always seat perfectly in their grooved sheaves.

facts ...for men who want to cut costs



57% increased production on a paper calender machine resulted from the installation of Texrope Drives. The Texropes operated so smoothly that speed was increased and breakage in sheets was *reduced.*

15% increase in the output of his presses resulted from the adoption of Texrope Drives by a printer. Elimination of vibration improved the quality of his printing. The Texropes eliminate shutdowns.

Noise is costly because it decreases efficiency in business. Texrope Drives are always silent . . . as well as slipless . . . ideal for ventilating systems.

50% saving in belt cost by using Texrope Drives instead of flat belts and the flat belt drive required 40% more floor space than Texropes.

10% increase in power factor (75% to 85%) where Texrope Drives were used instead of direct connection. Texropes are 98.9% efficient . . . and the efficiency is sustained for the life of the drive.

These are a few *facts* from Texrope users. Wherever the reduction does not exceed 7:1, and for loads up to 2000 H. P., you can save money.

May we send you a copy of Bulletin 1228?

ALLIS-CHALMERS MANUFACTURING CO., *(Texrope Division)*

Milwaukee — *Specialists in Power Machinery Since 1846* — Wisconsin

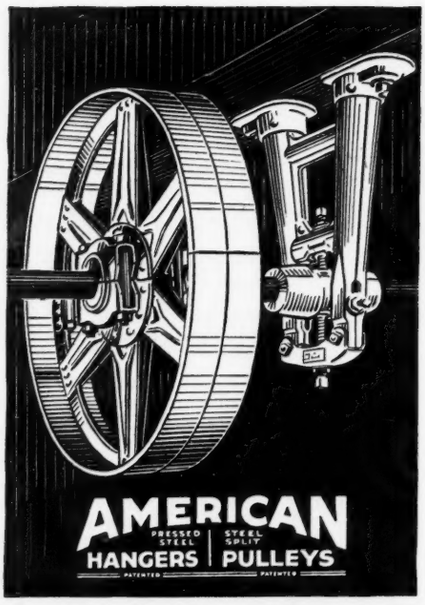
Atlanta, Ga., Baltimore, Md., Birmingham, Ala., Boston, Mass., Buffalo, N. Y., Charlotte, N. C., Chattanooga, Tenn., Chicago, Ill., Cincinnati, Ohio, Cleveland, Ohio, Dallas, Tex., Denver, Colo., Detroit, Mich., Duluth, Minn., El Paso, Tex., Grand Rapids, Mich., Houston, Tex., Indianapolis, Ind., Jackson, Mich., Kansas City, Mo., Los Angeles, Calif., Milwaukee, Wis., Minneapolis, Minn., New Haven, Conn., New Orleans, La., New York, N. Y., Philadelphia, Pa., Phoenix, Ariz., Pittsburgh, Pa., Portland, Ore., Richmond, Va., St. Louis, Mo., Salt Lake City, Utah, San Antonio, Tex., San Francisco, Calif., Seattle, Wash., Shreveport, La., Spokane, Wash., Tampa, Fla., Toledo, Ohio, Tulsa, Okla., Wilkes-Barre, Pa.

ORIGINATED BY ALLIS-CHALMERS

TEXROPE DRIVES

THE DRIVES THAT REVOLUTIONIZED TRANSMISSION PRACTICE • • •

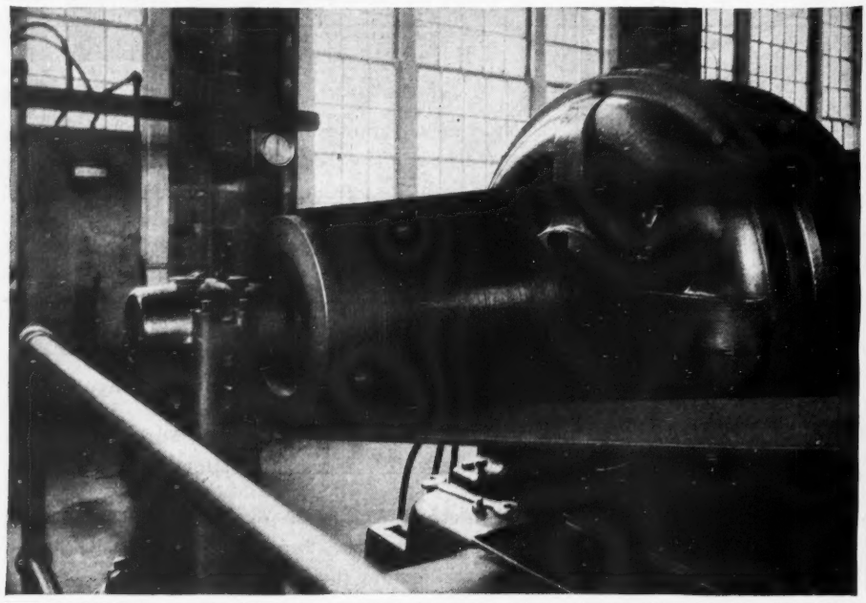
PULLEYS THAT DELIVER MORE POWER

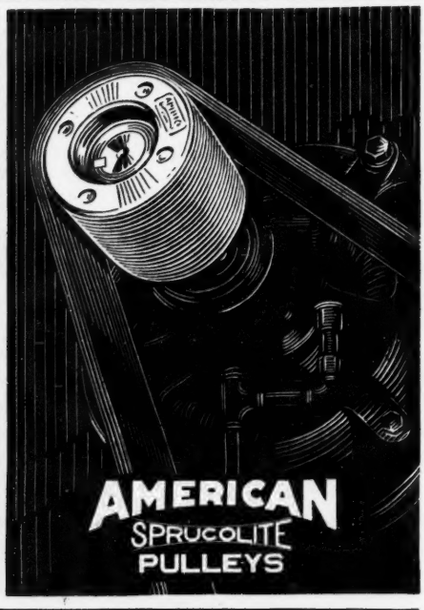


The electric motor's usefulness to industry depends first, upon its correct application to each particular power distribution problem, and second, upon the efficiency of the mechanical drive employed to transmit its energy to the work.

Whether your production problem dictates the connection of large motors to line shafting, whether smaller motors driving groups of machines is the most economical system, or whether individual motor drives utilizing flat or V-belt connections are desirable—American Transmission Products deserve your consideration.

Engineered by engineers for engineers, American Pressed Steel Shafting Pulleys and Hangers, American Sprucolite Motor Pulleys

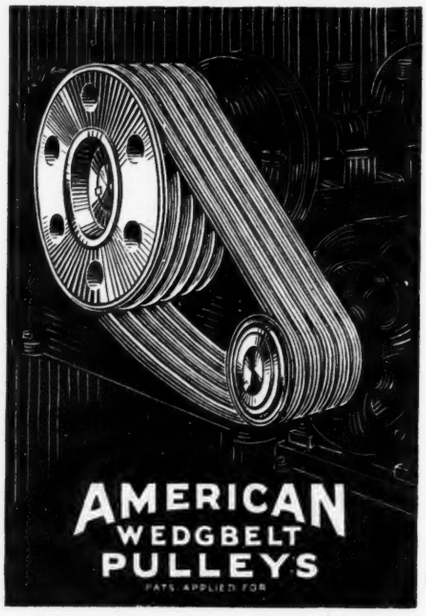




and American Wedgbelt Drives, all offer characteristics that are vital to the type of duty each is to perform in the carefully studied transmission systems of today.

For instance, the motor pulley shown in the illustration above (in use on a 250 h.p. motor, driving a compressor), grips the belt and hangs on in spite of the shock of sudden heavy loads. In service for many months it shows no wear either on crown or edges. It is made of Sprucolite, a specially durable synthetic material with an unusually high coefficient of friction, developed expressly for difficult motor pulley service.

Most good mill supply houses handle American Products. If your dealer cannot serve you, write for the name of one who can.



THE AMERICAN PULLEY COMPANY

4200 WISSAHICKON AVE. PHILADELPHIA

The *new* Ice Age

...is machine made!

In New England York Refrigeration is helping develop quick freezing of fish. On the Pacific Coast, tuna clippers equipped with York Refrigeration are bringing back, in perfect condition, catches taken in tropic waters. In the Middle West it is freezing meats. In Florida it protects grapefruit ... in Oregon, deciduous fruit ... and all over the continent, milk, butter and eggs.

The production and distribution of foods for a continent has brought about a new Ice Age. It is machine made ... and, to a substantial extent, York made.

York has pioneered refrigeration for over 50 years. In that time, York has worked out the special applications of refrigeration to every one of the food industries ... in every branch of these industries ... production, transportation, warehousing and retail distribution of every kind of foodstuff.

With this background of experience, York has developed new and more efficient refrigerating equipment to meet all needs ... York has solved problems of installation and operation ... York has gathered a vast fund of data directly applicable to your own business ... whether it is production, cold storage or retailing.

York engineers are qualified to consult with you on your own particular problems, to recommend most suitable equipment, to design installations, to undertake erection ... so that you will get the most from your York Refrigerating Equipment.

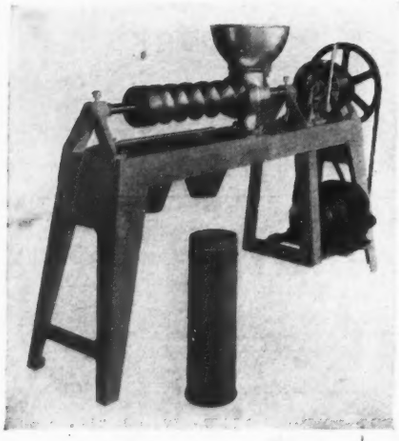
Communicate with the nearest of York's 71 conveniently located direct factory branches.

YORK ICE MACHINERY CORPORATION

» » YORK » PENNSYLVANIA « «

YORK

REFRIGERATION



The American Utensil Company
offers its
IMPROVED — 1931

TOMATO JUICE EXTRACTOR

This is an inexpensive, continuous feed device which works by reason of the unique shape of the spiral and not by any speed arrangement. It is not a pulper with juice as a second thought. It is designed to make juice only, of any consistency desired, either thick or thin, and can be so adjusted while in operation.

PRESSURE . . . NOT SPEED

The juice is removed by the pressure derived from a cylindrical shaped, tapered feed screw, which revolves inside of a very fine mesh pure nickel screen. The juice is gradually pressed or squeezed through the screen as the tomatoes work forward and up from the deep grooves at the inner end of the spiral to the more shallow grooves at the outer end. By means of an adjustable separator under the screen, the heavier pulp is blocked off from the juice and taken off through a separate outlet, and the seeds, fibre, skins and cores are discharged at the outer end of the screen.

COMPLETELY NON-AERATING

Tomato Juice, if made the proper way, is wanted because of its pleasing taste and high food value. Both can be very easily destroyed by aeration in the making of the juice. That is why we offer a wholly non-aerating machine. No beating or whipping process that incorporates air and destroys the vitamins is necessary or present at any time with our equipment. This assertion is best proved by our large list of users who will tolerate only the best.

American Utensil Co., 10 So. La Salle St., Chicago

CAPACITY 2000 BUSHELS PER DAY

Over seventy of our Tomato Juice Extractors were used last season by the most representative packers. Their experiences in making Tomato Juice have been incorporated in our improved machine. *We have increased the capacity* and made the machine easier to operate. All new parts fit into the machines used last season and are interchangeable with the old parts. Parts coming in contact with the juice are furnished in the generally accepted alloy metals.

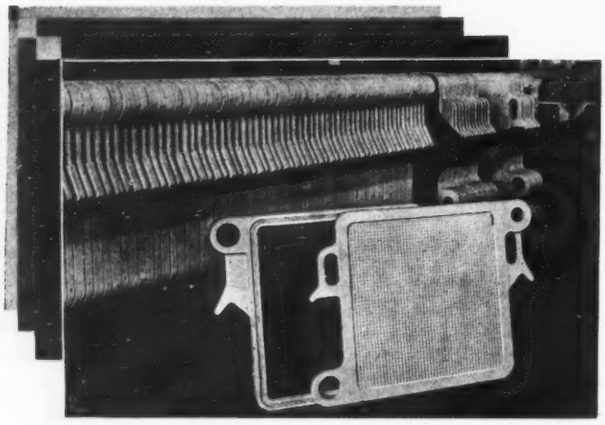


PLATE TYPE
PRESSES HAVE
LOW FIRST COST

Perhaps you too would find this type of press more economical

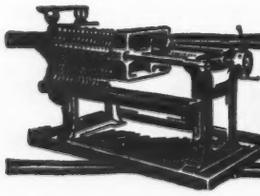
It represents a recent Sperry development in a Vitreous Enamel Coated, Cast Iron Plate and Frame Press.

The frames on this press are grooved to receive rubber gaskets. This construction prevents damage to plate coating and filter cloths as well as providing a tight seal between the plates and frames. The parts are carried on rubber packed lugs.

The press is a double end, parallel connected type with 30 frames and 29 plates at each end. An unusually large and efficient installation.

We will be glad to tell you more about this press or other recent coated plate press designs we have built.

D. R. SPERRY & CO., BATAVIA, ILL.



SPERRY FILTER PRESSES

H. E. JACOBY, 95 Liberty Street
New York

B. M. PILHASHY, Merchants Exchange Bldg.
San Francisco

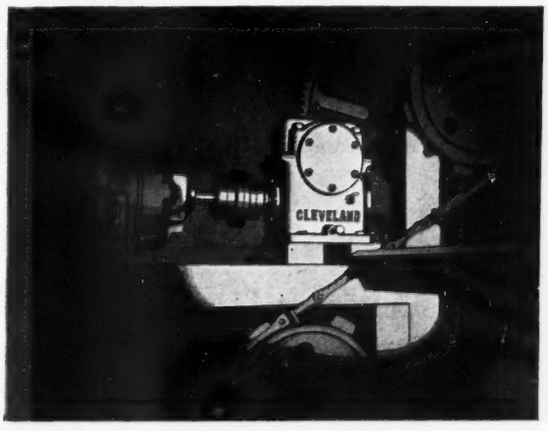
On *thousands* of these speed reducers

. . . No part has ever been replaced . . .

Owners of "Cleveland" Worm Gear Reducers, continually express surprise that a power transmission unit can deliver dependable service at such low cost. Often, a "Cleveland" Unit runs five years without having the housing cover removed, incurring no cost and receiving no attention whatever except occasional oiling. In many large plants, where periodic inspection is made of all machines, "Cleveland" Units are excepted because inspection has been found unnecessary.

A check of sales records shows that on the great majority of "Cleveland" Reducers, not a single part has been replaced, although many have been in operation 10 years and some, 15 years. Conservative rating, providing an adequate safety factor, keeps the power "flowing through" at high efficiency—even under adverse conditions.

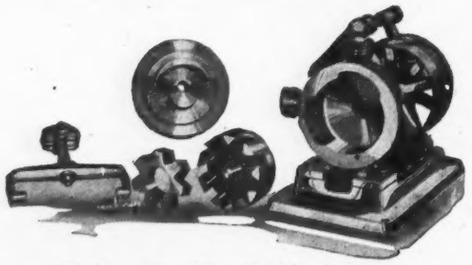
When a speed reducer will give unfailing service at lowest cost, purchase price, depreciation, operation, and maintenance considered, its owners are receiving every advantage that a speed reducer can give. Over 4,000 engineers will tell you "Cleveland" is that speed reducer.



Cleveland Unit Type AH driving conveyor in canning plant. Ratio 17½:1, 1750 r. p. m.

CLEVELAND
WORM & GEAR COMPANY
3278 EAST 80TH STREET . . CLEVELAND, OHIO
CLEVELAND WORM GEARING . . THE ULTIMATE DRIVE

"Spick-and-span" CLEAN



Just two moving parts,—the internal gear rotor and the pinion! The Perfection is easily accessible, easy to disassemble, easy to keep spick-and-span clean.

Extremely smooth finish inside, extreme accessibility and the fact that there are but two moving parts—these are some reasons why the Perfection Rotary Sanitary Pump is the favorite pump for handling liquid food products and for similar service.

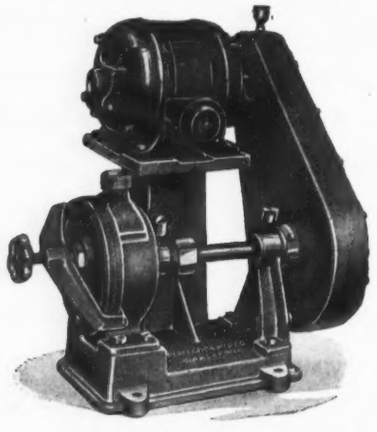
Another superior feature is the use of the helical gear which gives the pump a positive action and a steady pulsationless flow, that is free from excessive churning.

This is due to the fact that the teeth of the helical gears shear through the liquid on an angle instead of splashing through head on, the usual method.

This smooth, pulsationless flow is particularly to be desired where the product to be pumped is milk, cream, ice-cream mix, etc.

Durability, simplicity, efficiency, and economy are features of the Perfection. Write for details and prices.

PERFECTION MANUFACTURING CO.
2186 EAST Hennepin Ave., Minneapolis, Minn.



PERFECTION ROTARY PUMPS

PFIZER'S CITRIC ACID

POWDERED
GRANULATED
CRYSTALS

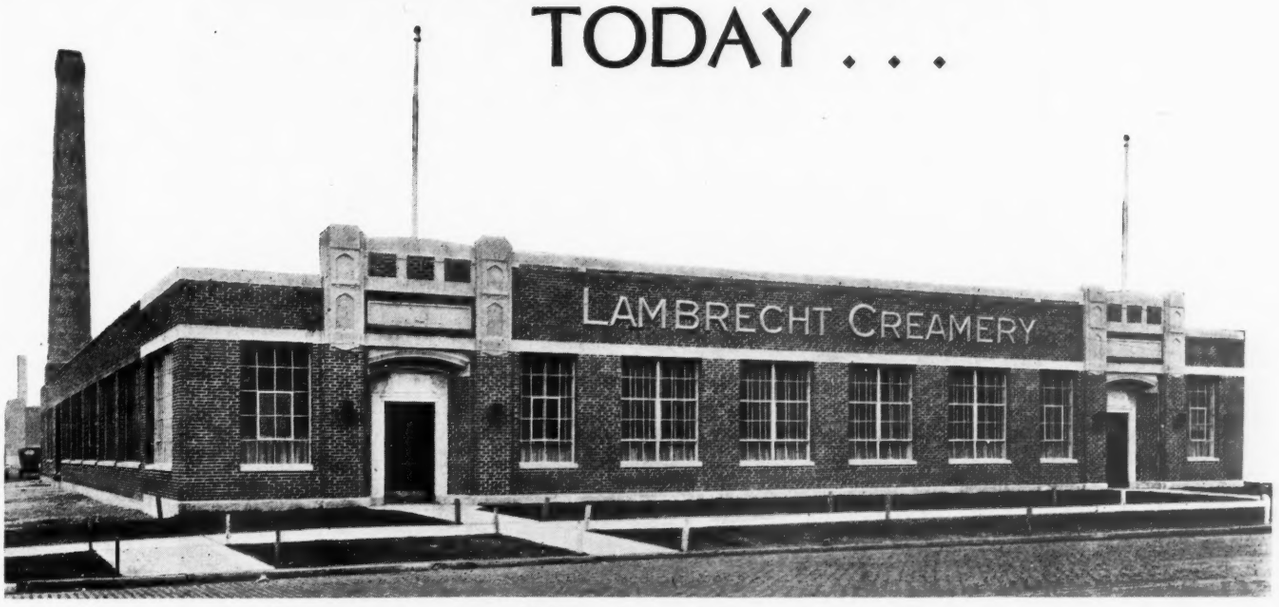
SODIUM CITRATE

UNIFORM QUALITY
STRICTLY U.S.P.

EIGHTY YEARS OF MANUFACTURING EXPERIENCE BEHIND OUR PRODUCTS

CHAS. PFIZER AND CO. INC.
MANUFACTURING CHEMISTS
81 Maiden Lane New York N.Y.
EST. 1849
444 W. Grand Ave Chicago Ill.

YESTERDAY'S DAIRY METHODS
are far too costly
TODAY . . .



Modern Creamery in the Mid-West, Designed, Built and Equipped by Austin

Good engineering holds the stage in present dairy production . . . for modern plants function like a mammoth machine. Milk moves in orderly, continuous process from the time it enters the receiving room until the products are ready for the public.

Intimate experience and progressive engineering are needed for the exacting requirements of layout, equipment and plant design . . . piping for process water and steam . . . power and refrigeration.

The building must be more than an enclosure for the mammoth machine it houses . . . must provide clean air, good light and ventilation . . . construction should embody the sanitary advantages of steel, concrete, brick and tile. Proper consideration must be given to incoming and outgoing traffic.

In the face of these exacting demands you will find the experience of Austin Engineers invaluable in the design and construction of dairy plants, warehouses or branch facilities.

Austin provides for a complete service. Consulting, designing and construction engineers develop your plant from plans to completion . . . turning over to you at the fulfillment of their contract, a dairy plant ready for immediate production!

For an interesting discussion of your problems why not phone, wire or mail the convenient memo below? An Austin Engineer will be glad to give you helpful information and estimates on any contemplated project . . . without obligation, of course.

THE AUSTIN COMPANY
Engineers and Builders - - - Cleveland

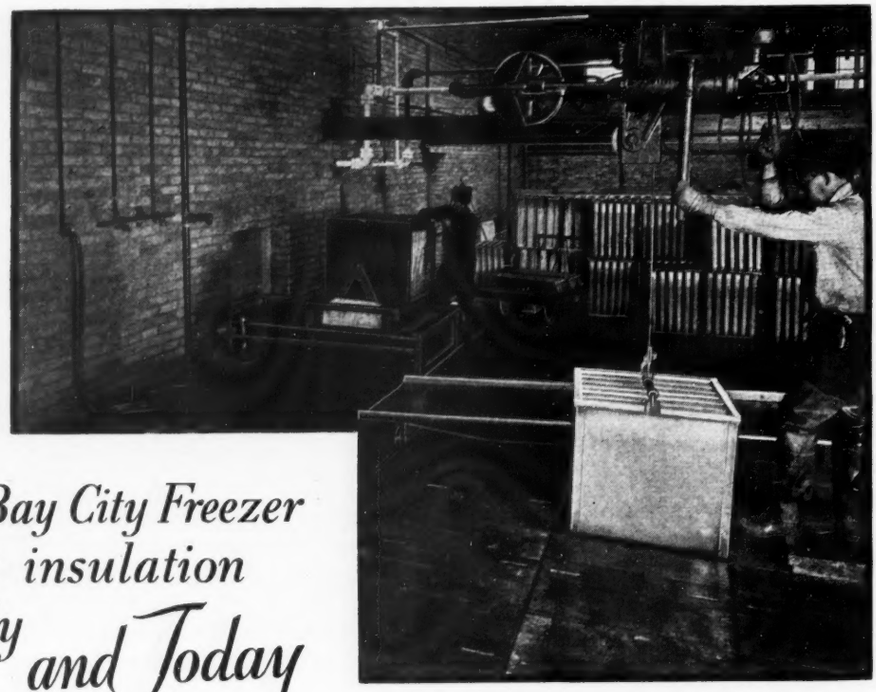
NEW YORK CHICAGO DETROIT NEWARK
PHILADELPHIA CINCINNATI PITTSBURGH
BOSTON ST. LOUIS SEATTLE PORTLAND
THE AUSTIN COMPANY OF TEXAS: DALLAS

THE AUSTIN METHOD

THE AUSTIN COMPANY OF CALIFORNIA, LTD.:
LOS ANGELES, OAKLAND AND SAN FRANCISCO
THE AUSTIN COMPANY, LIMITED,
TORONTO AND VANCOUVER, B. C.

Memo to The Austin Company, Cleveland ☐ Send copy of booklet "101 Questions That Should be Answered Before You Build."
☐ Our Door is Open to New Ideas! We are interested in a ..... project of approximately ..... sq. ft.
Location ..... Individual ..... Firm ..... City ..... F.I. 3-31

When "QUICK-FREEZE" was new..



Freezing cans being removed from cold room of the Bay City Freezer. 6" and 8" of Armstrong's Corkboard help to maintain temperatures 25 to 30 degrees below zero in this pioneer quick-freeze plant.

In 1922 Bay City Freezer used cork insulation exclusively and Today

CORK is still "standard insulation"

QUICK-FREEZING with low temperatures was radically new 8 years ago. There was no precedent to guide Paul Willer Petersen when he built his first plant, the Bay City Freezer, in 1922.

But even then Armstrong's Corkboard was the standard insulation for cold storage. Mr. Petersen believed that the insulation which had served this industry so well for 20 years and more would guard his new low temperatures of 25° to 30° below zero.

So he insulated his quick-freezing tank with two layers of four-inch Armstrong's Corkboard. The results justified his belief. To quote his own words, this cork "has served to date without the slightest symptoms of needing replacement."

Now quick-freezing has made widespread progress. New low temperatures have been inaugurated in almost every branch of the food industry. And wherever they are found, there also is Armstrong's Corkboard. The exceptional insulating efficiency of cork makes it possible to maintain low temperatures without imposing an extra strain on refrigerating machinery. More important, it resists moisture, the deadly enemy of insulation. Throughout years of the hardest kind of service, Armstrong's Corkboard retains its efficiency.

Armstrong's Frozen Foods Development Committee is ready to help you secure the most efficient operation from equipment—no matter what the temperature you wish to maintain. Experienced insulation engineers are continually conducting experiments with many types of installations. Their knowledge and experience are available to the industry without charge. Just write to the Frozen Foods Development Committee, Armstrong Cork & Insulation Co., 948 Concord Street, Lancaster, Pa.

Armstrong's (A) Product

Armstrong's Corkboard Insulation

THE STANDARD INSULATION FOR ALL REFRIGERATION

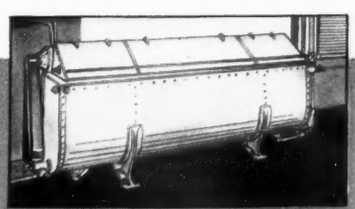
H T H

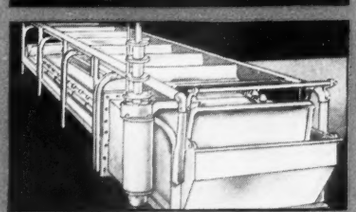
CHLORINE IN ITS NEWEST FORM

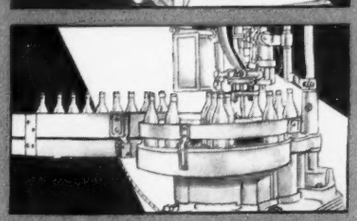
Protects Food Profits

The daily use of H T H for sterilizing and disinfecting provides a safe, economical way to prevent the spoilage of perishable food products. ¶ Bacteria, yeasts, molds and offensive odors that persistently defy other attacks are completely destroyed by H T H solutions. . . . The sterilizing action of H T H is the most effective known to modern science. H T H solutions are non-poisonous, practically odorless and are readily applied to equipment, utensils, tables, floors, walls, ceilings . . . wherever there is danger of product contamination. ¶ A stable, highly concentrated powder containing 65% of available chlorine, no other product on the market compares to H T H. It is easy to prepare and to apply. Write for booklets "Food Plant Sanitation" and "Chemical Sterilization."

THE MATHIESON ALKALI WORKS (Inc.), 250 Park Avenue, New York, N. Y.







Readily soluble in cold water, H T H requires no special equipment. One can of H T H produces 30 gals. of stock hypochlorite solution, containing 1% of available chlorine (10,000 p.p.m.) at a cost of less than 5¢ per gal. This stock solution is easily diluted with water to any desired sterilizing strength, or solutions can be made up in smaller quantities, as needed, from dry H T H. Stock solutions are stored for prolonged periods of time without appreciable loss in strength.

A Superior Product for Convenient and Accurate Preparation of Bleaching and Sterilizing Solutions
Readily Soluble — Uniform — Concentrated
The Mathieson Alkali Works (Inc.)

HIGH SPOTS IN CHEMICAL HISTORY

No. 1 of a series of advertisements tracing the development and uses of modern chemicals

AMMONIA

To Joseph Priestley belongs the distinction of establishing the fact that ammonia is composed of hydrogen and nitrogen.

IN 1774, Joseph Priestley, heating a mysterious looking substance over a fireplace, drove a protesting family from his humble cottage in Leeds, England. The biting, pungent fumes came from ammonia—a mixture of nitrogen and hydrogen which the chemist-minister had collected over mercury. More than one hundred and fifty years later the same colorless gas was to become one of the world's most useful commodities.

Today, the manufacture of synthetic ammonia together with improved methods for its transportation and handling, mark one of the greatest triumphs of chemical engineering. Thousands of tons of ammonia are used annually by the refrigeration industry. The use of ammonia for making nitric acid has effected exceptional economies in producing explosives, synthetic fabrics and other cellulose products. The manufacture of high nitrogen fertilizers from ammonia seems destined to render American agriculture independent of foreign sources of supply.

Anhydrous ammonia is used to supply nitrous gases in manufacturing sulphuric acid ...in nitriding steel, which is equivalent to case hardening... for neutralizing acids in oil refining...as a raw material in organic synthesis...as an important source of hydrogen or nitrogen in welding operations.

One of the most important recent developments in the use of ammonia in combination with chlorine is in treating water supplies. Preammoniation treatment of water prevents unpleasant tastes and odors, increases the efficiency of chlorine and is simple and economical to apply.

Constant improvements in manufacturing processes have given American anhydrous ammonia users the benefits of a most economical and most useful alkali—one of several circumstances that has speeded the progress of chemical engineering.

. . .

As one of the oldest producers of synthetic anhydrous ammonia in the United States, Mathieson is able to offer ammonia users the product quality and complete service available only where modern, economical methods of production and distribution prevail.

MATHIESON CHEMICALS

Great Structures Rest on Strong Foundations

MATHIESON CHEMICALS
SERVICE
RESOURCES | RESEARCH

PRINTED IN U.S.A.

Soda Ash . . . Caustic Soda . . . Bicarbonate of Soda . . .
HTH (Hypochlorite)...Liquid Chlorine...Bleaching Powder...
Ammonia, Anhydrous and Aqua...PURITE (Fused Soda Ash)

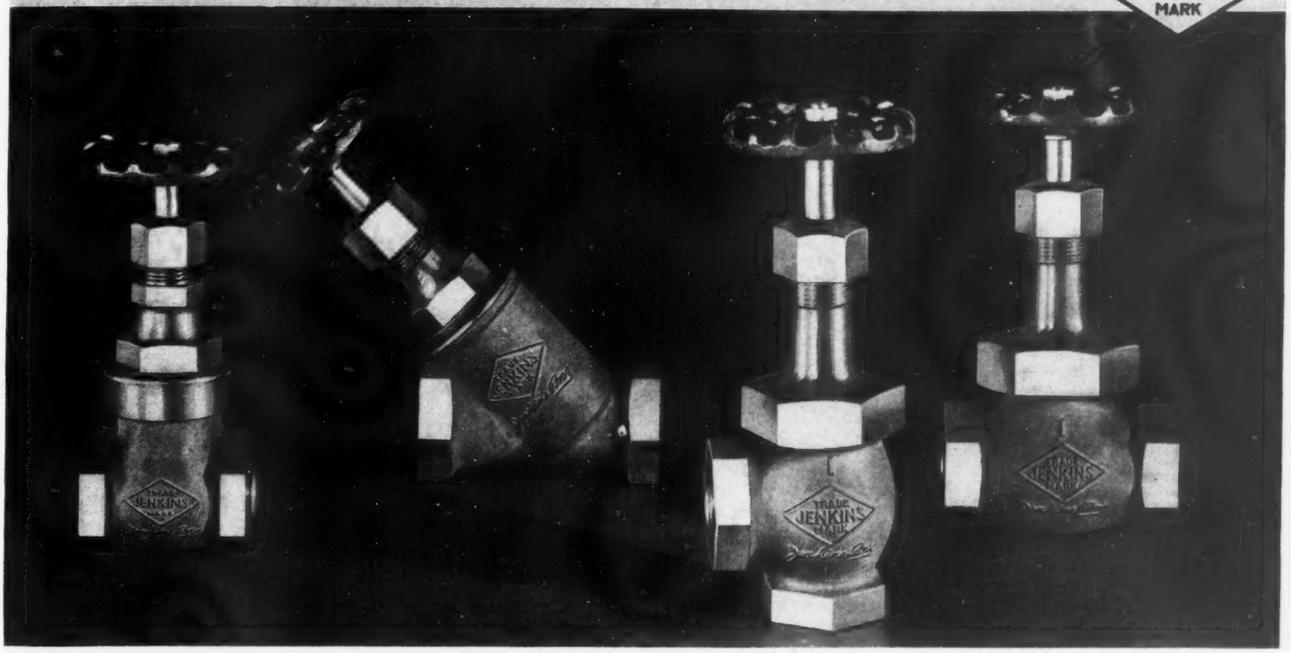
The MATHIESON ALKALI WORKS (*Inc.*)
250 PARK AVENUE, NEW YORK, N. Y.

Philadelphia Chicago Providence Charlotte Cincinnati

Works: Niagara Falls, N. Y., Saltville, Va. *Warehouse stocks at all Distributing Centers*

Jenkins VALVES ARE ALWAYS MARKED WITH THE "DIAMOND"

TRADE JENKINS MARK



A group of Jenkins Bronze Valves—from left to right: Fig. 370, Jenkins Standard Bronze Gate Valve; Fig. 124, Jenkins Standard Bronze Y or Blow-Off Valve; Fig. 108-A, Jenkins Standard Bronze Angle Valve; and Fig. 106-A, Jenkins Standard Bronze Globe Valve. The Angle and globe valves shown have the new Jenkins advantages of the one-piece screw-over bonnet and slip-on stay-on disc holder.

Where famous foods are made these famous valves are found

SPREAD the banquet from soup to nuts, and in the home of every item on the menu you will find Jenkins Valves relied on for close control of fluid flows.

Campbell, Swift, Van Camp, Armour, Borden, National Biscuit, Heinz, Ward and Whitman . . . in these famous plants, as in many others, Jenkins Valves are providing good performance in all piping . . . in the power plant, in plumbing, heating or fire protection service.

The durability of fine metals . . . the efficient, easy operation that goes with correct design . . . these are genuine Jenkins advantages . . . advantages which are reflected definitely in lower plant maintenance.

Jenkins Valves are obtainable through supply houses everywhere.

JENKINS BROS.

80 White Street, New York, N.Y. — 133 No. Seventh Street, Philadelphia, Pa.
584 Atlantic Avenue, Boston, Mass. — 646 Washington Boulevard, Chicago, Ill.
JENKINS BROS., Limited, Montreal, Canada; London, England
Factories: Bridgeport, Conn.; Elizabeth, N. J.; Montreal, Canada

Jenkins

BRONZE IRON STEEL

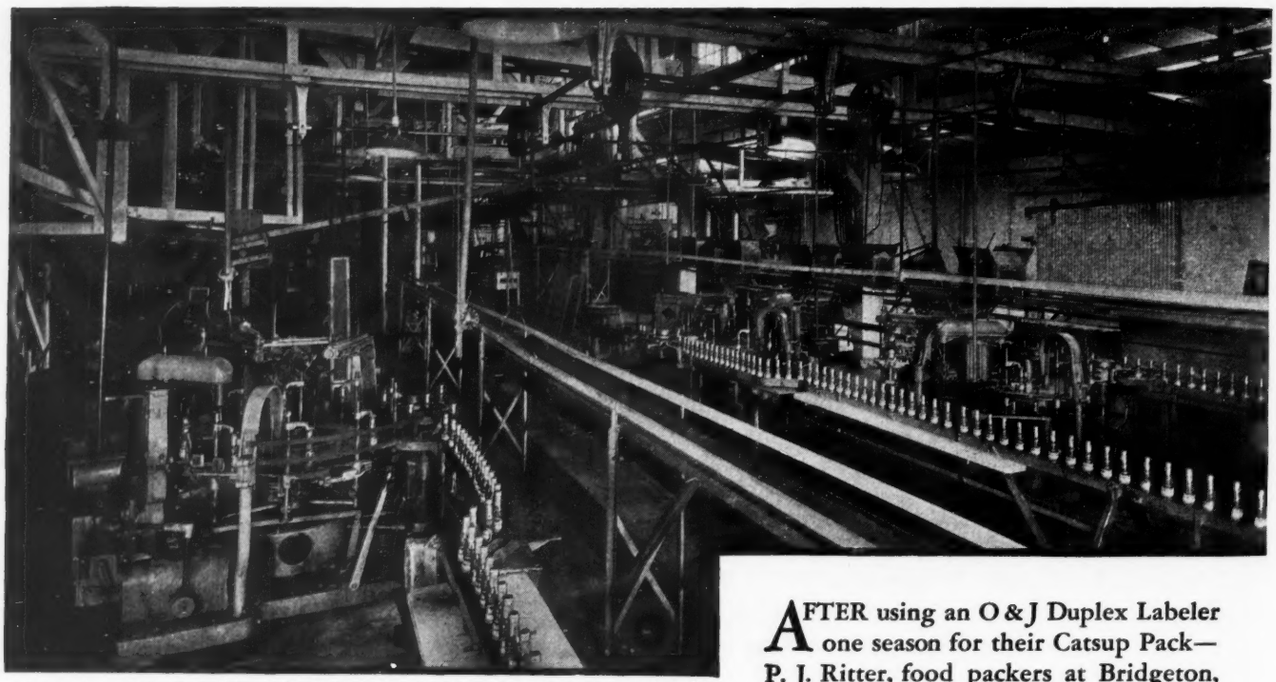
VALVES

Since 1864

Three types of Ritter Catsup bottles which are labeled on O&J Duplex Labelers. Note the neck labels on two and the foil on the bottle in the center.

P. J. RITTER *gives* A PERFECT TESTIMONIAL

for O & J LABELERS *by purchasing* 2 More DUPLEX Machines



A portion of the P. J. Ritter plant showing the three O & J Duplex Labelers

O&J LABELING MACHINE CO.
60 Ellsworth Street, Worcester, Mass.
Division of
THE LIQUID CARBONIC CORPORATION

Liquid

AFTER using an O & J Duplex Labeler one season for their Catsup Pack—P. J. Ritter, food packers at Bridgeton, N. J., were so well pleased with its performance that they purchased two additional machines the next season.

The last two labelers were bought strictly on the strength of the cost saving advantages and the efficient dependable operation of the first machine. The savings which these labelers are effecting over the old method of labeling will pay for the three machines in a short time.

If you would like to have a detailed report of comparative labeling costs and exact savings which O & J Labelers have effected in other plants, write for Survey L-10.

AN ADHESIVE FOR EVERY MACHINE OR HAND OPERATION

THOSE • TOUGH CARTONS

MANY manufacturers of corrugated and fiber containers are lining their cases with tougher kraft papers, which makes the sealing operation quite difficult.

MIKAH

CASE SEALING GLUE

has been developed for these containers. Operates perfectly either by machine or hand, not only on special stocks but also on regular grades.

A trial barrel will be sent on approval.

NATIONAL ADHESIVES CORPORATION

Executive Offices: NEW YORK

WORLD'S LARGEST PRODUCER OF ADHESIVES

MORE of this merry rolling will mean less grief in your materials handling. A cheerful quality in industrial casters that corresponds to human lightheartedness—that is the distinguishing characteristic of Service Casters. It is easily explained by the Timken, Service and Hyatt bearings so carefully designed into these ever-willing wheels. And just as merry people live longer, so trucks *"castered by Service" go happily into ripe old age.*

Your own trucks revitalized by the easy application of Service Casters—or, Service Trucks all ready to breeze along over standard Service running gear—These are two ways to set your loads humming along to the tune of rising industrial activity. *Write, while the melody lingers, for the data which will complete your decision.*

SERVICE CASTER & TRUCK CO.
525 N. Albion St., Albion, Michigan

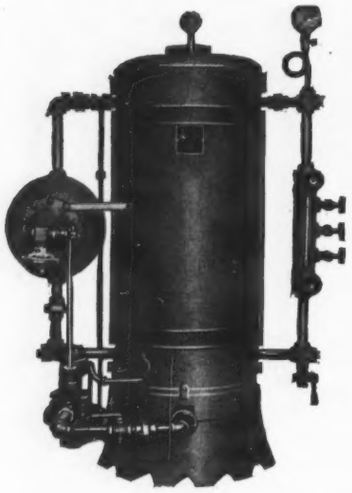
Chicago: 603 Washington Blvd. NewYork: 200 Lafayette St. San Francisco: 61 Bluxome St.
England: 15 Mallow St., Old St., London Canada: Brock & Campbell Sts, Brantford, Ont.

Service CASTERS & TRUCKS

STEAM!

...make it Automatic

You must have a thoroughly dependable steam supply for Kettles, Still-retorts, Vacuum Chambers, Cookers, Mixers, and all steam equipment for the preparation of food. The slightest fluctuation in temperature or pressure can be costly out of all proportion to the slight expense of avoiding these by using an independent process steam source, preferably gas-fired for easy operation, and *automatic*, as with an OFELDT Boiler . . . for *processing*, engineers have not yet discovered a boiler that functions more efficiently and dependably than the Ofeldt



Steam in 4 minutes
Ofeldt
TRADE MARK

The Automatic operation of the Ofeldt reduces labor attention to a few minutes per day, combustion of fuel only as steam is needed, freedom from attendance, and perfect safety.

Compactness is another desirable feature of the Ofeldt . . . that, and the resulting elimination of long, inefficient pipe lines, together with immediate accessibility. Labor charges are reduced enormously when the Ofeldt is installed. Fuel and ash problems are not factors, and delays are virtually eliminated because the Ofeldt steams 4 minutes after lighting. (No other boiler of equal high efficiency will do this.) Write for Bulletins on the Ofeldt. Our nearest branch office or distributor will give your needs immediate attention.

MEARS-KANE-OFELDT INC.

1903-1915 EAST HAGERT ST., PHILADELPHIA

New York—9 Park Place
Boston—100 Arlington St.
Chicago—325 W. Huron St.
Buffalo—Walbridge Bldg.
St. Louis—2010 Locust Blvd.
Birmingham—Am. Trust Bldg.

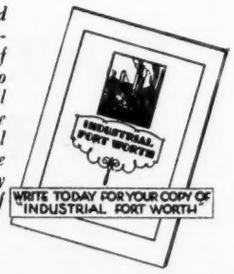
FORT WORTH
THE LOGICAL COLD STORAGE AND RECONSIGNING POINT

More than 65 per cent of all fruits shipped out of California for the North, East and South come in solid train loads and are redistributed from Fort Worth thru electrically operated yards with electrically controlled retarders, insuring smooth handling of perishables.

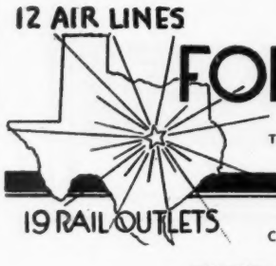
Superior icing facilities for fruits and vegetables in transit.

The greatest cold storage warehouse in Texas, with a capacity of more than one million cubic feet, is now under construction. Two more major and several smaller cold storage plants already handle tremendous volume.

The enormous production of fruits and vegetables in this territory offers tremendous opportunities for location of canning establishments, and the two new dams now under construction will impound water making possible the irrigation of 52,000 additional fruitful acres in Fort Worth's immediate vicinity. Fort Worth is indisputably the food products clearing house of the Southwest.



12 AIR LINES



FORT WORTH

THE MANUFACTURING AND TRANSPORTATION CENTRE OF THE SOUTHWEST

For Information, Address Publicity Department
CHAMBER OF COMMERCE FORT WORTH TEXAS

ENDURO Equipment

KEEPS FOOD PRODUCTS UP TO THE HIGHEST STANDARDS

NO DISCOLORATION OR FOREIGN FLAVOR POSSIBLE WHEN THIS UNPLATED, UNTARNISHING, ECONOMICAL STEEL IS USED.

"The ideal material—durable and economical—easily cleaned"—is the verdict of users of ENDURO processing equipment. The food industry has long sought this type of metal.

In the preparation of fruits, vegetables or meat products; in the making of buttermilk, ENDURO equipment assures a perfect quality product — because ENDURO stainless can no more affect the flavor or color of food products than can glass — or even the noble metals.

But ENDURO is far stronger than ordinary steel, so ENDURO equipment will withstand severe usage. It has no plating or surface coating to chip off or wear away. The silver-like lustre remains indefinitely.

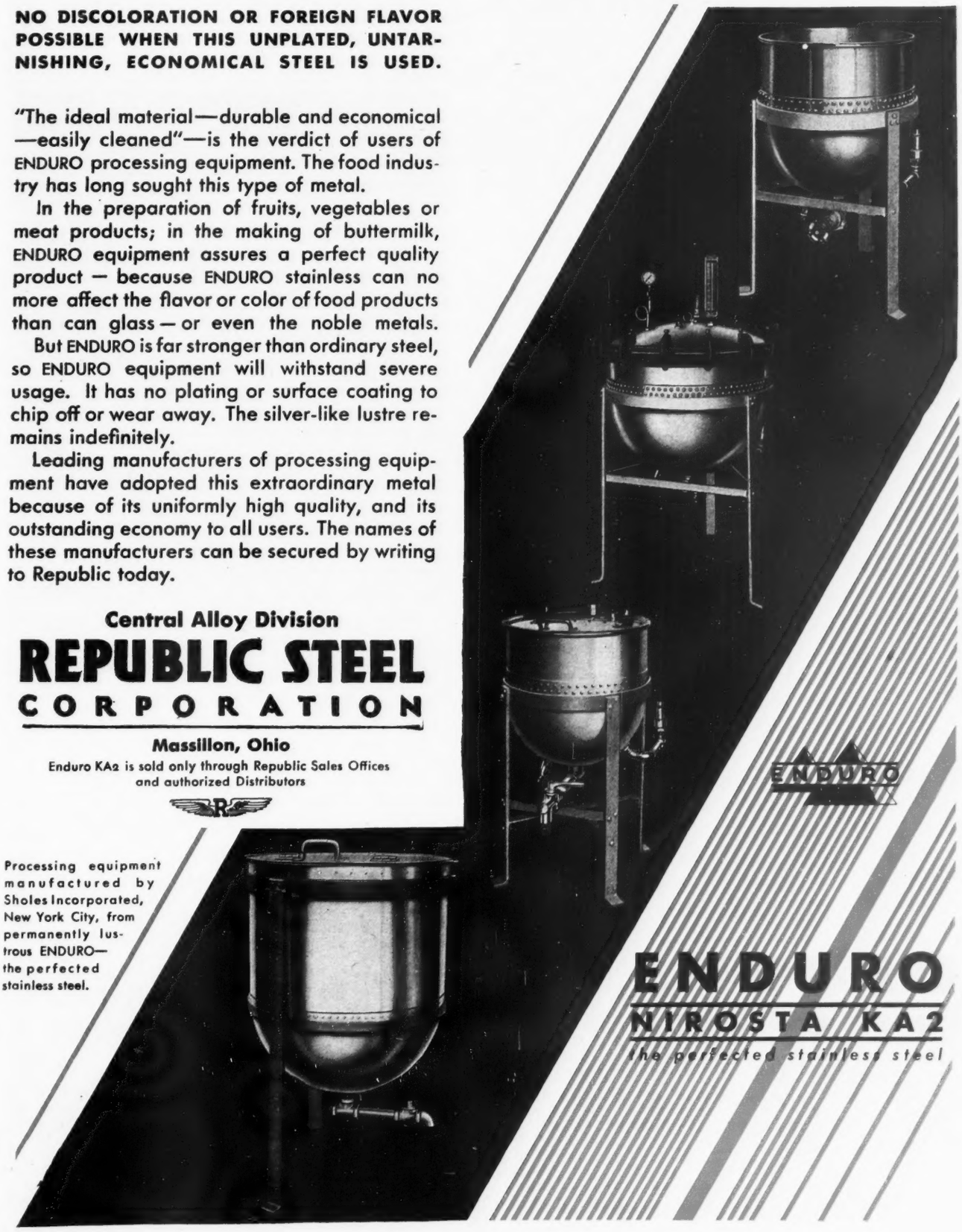
Leading manufacturers of processing equipment have adopted this extraordinary metal because of its uniformly high quality, and its outstanding economy to all users. The names of these manufacturers can be secured by writing to Republic today.

Central Alloy Division

REPUBLIC STEEL CORPORATION

Massillon, Ohio

Enduro KA2 is sold only through Republic Sales Offices and authorized Distributors

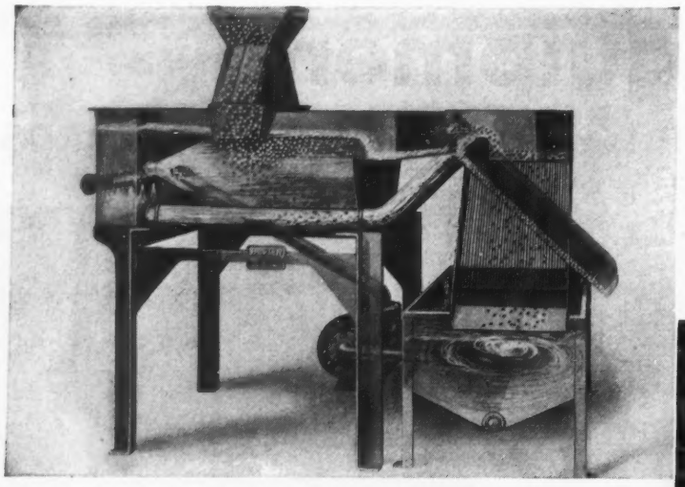


Processing equipment manufactured by Sholes Incorporated, New York City, from permanently lustrous ENDURO—the perfected stainless steel.

ENDURO

NIROSTA KA2

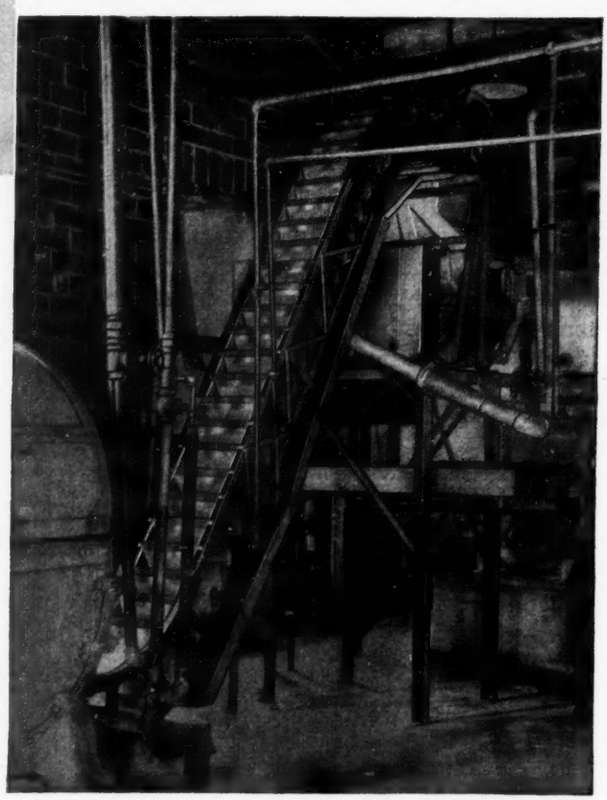
the perfected stainless steel



Left: Phantom view of the "Berlin" gravity pea separator, a product of the BERLIN CHAPMAN CO., Berlin, Wis. All parts except frame and accessories are constructed of Pure Nickel. More than 50 units of this type have been installed in modern canning plants throughout the country.

• • •

Below: One of more than fifty installations of Nickel "Berlin" gravity pea separators. This one is at The Pardeeville Canning Co., Pardeeville, Wis.



Brining Equipment is

safer *and* stronger

when it's made of pure

SOLID NICKEL

•

LONG EXPERIENCE with many different kinds of materials has convinced leading canners that there's nothing like pure, solid Nickel for brining and other equipment exposed to the action of corrosive processing solutions.

Nickel's great resistance to brine corrosion is a dependable safeguard against organic and bacterial deposits that cause "flat sours" or impairment of product flavor. Moreover, Nickel is one of the easiest of all materials to clean and keep clean. Its dense structure and glass-smooth surface affords no foothold for dirt or tenacious food particles. It will not retain stale odors.

Nickel equipment pays for itself in service, too. Its steel-like strength fortifies it against rapid wear, denting and scratching. It cannot rust and has no coating to chip, peel or wear off. Solid Nickel equipment can stand years of hard use and abuse without losing its inviting attractiveness.

Let us send you "Modern Ideas In Food Plant Sanitation"—a booklet you will find invaluable in planning your next equipment installation.

Nickel

PROTECTS BETTER LONGER

THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL STREET, NEW YORK, N. Y.

INCO NICKEL TRADE MARK

Duxbak Leather Belting and the New Rockwood Drive...

A Modern and Efficient Power Transmission Unit

The new Rockwood Short Center Drive operates upon the simple and effective principle of the hinged and swinging motor base. It employs a single flat belt of standard width and ply. From our knowledge of the Rockwood Drive in service we can say without reservation that it gives an excellent account of itself from the standpoint of costs or efficiency.

On any drive, including the Rockwood, an efficient belt must be a pliable belt. Duxbak Leather Belting is specially tanned so that it bends easier and with less internal friction. The pulley gripping and overload capacity of its fine surface especially recommends it for use with the Rockwood Drive.

A Flat Belt Drive... The Rockwood Drive uses a single flat belt of standard width and ply. (Investigate Duxbak for its exceptional pliability.)

Sizes... The Rockwood Drive is made in six standard stock sizes from 1/4 to 50 H. P. Larger sizes made on order.

Initial Costs... The Rockwood Drive often costs from one-third to one-half less than the multiple strand V belt drive.

Maintenance Costs... The Rockwood Drive will run without attention or interruptions. Its single flat belt is maintained at constant tension under all loads, automatically.

Efficiency... The Rockwood Drive will maintain an over-all efficiency of 98½% at all times.

Changing Present Equipment... Your present equipment can be changed over easily and at small expense. The Rockwood Drive is one of the simplest and easiest of all drives to install.

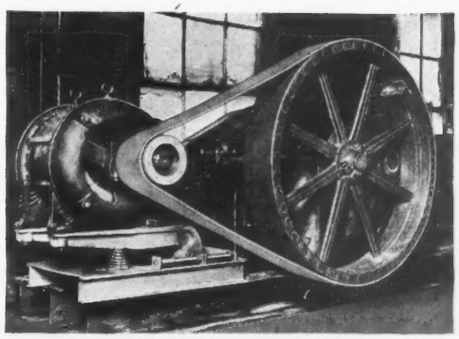
NOW is the time to find out how to reduce power transmission costs. Duxbak Leather Belting and the new Rockwood Drive offer certain definite advantages that are worthy of investigation.

DUXBAK BELTING

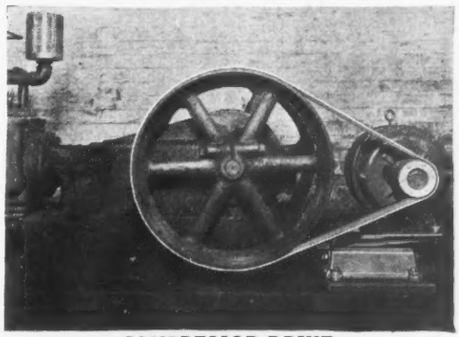
Chas. A. Schieren Company

Tanners
Belt Manufacturers
40 FERRY STREET NEW YORK

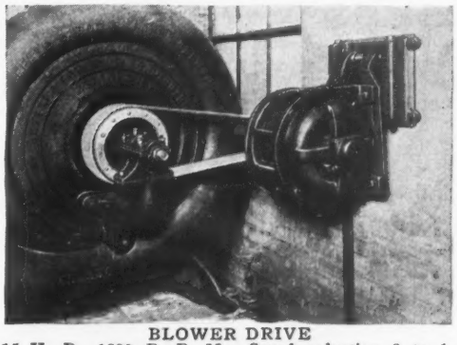
CHAS. A. SCHIEREN COMPANY OF CANADA
711 St. James Street, Montreal, P. Q.
64-66 Front Street, W., Toronto, Ont.



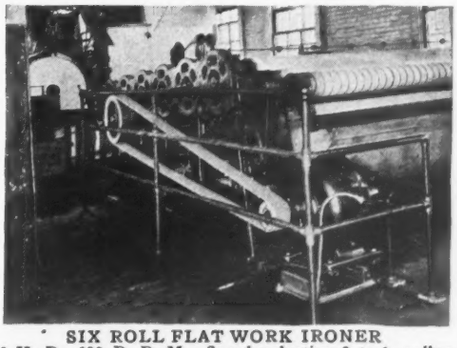
HYDRAULIC PUMP DRIVE
Special welded steel base for motors over 50 H. P. Motor shown 60 H. P., 1200 R. P. M. Speed reduction 6 to 1, pulley centers 50 inches.



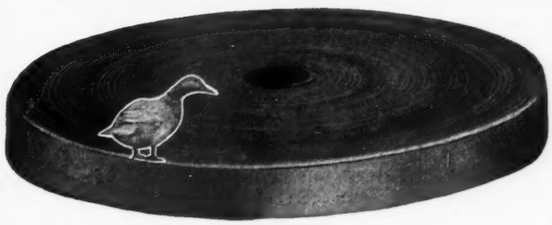
COMPRESSOR DRIVE
10 H. P., 1800 R. P. M. Motor speed reduction 5 to 1, pulley centers 25 inches.



BLOWER DRIVE
15 H. P., 1200 R. P. M. Speed reduction 2 to 1, pulley centers 22 inches.



SIX ROLL FLAT WORK IRONER
3 H. P., 600 R. P. M. Speed reduction 3 to 1, pulley centers 7½ feet.



CHAS. A. SCHIEREN COMPANY
40 Ferry Street, New York, N. Y.

Send me a copy of folder describing the new Rockwood Short Center Drive.

Name.....

Position.....

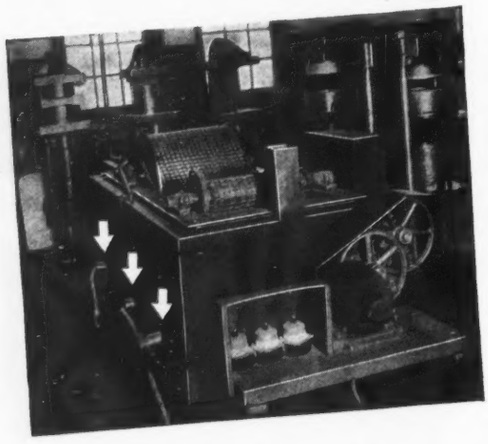
Company.....

Address.....

Modernize with G-E "Spots of Heat"

FOR HEATING JOBS LIKE THESE

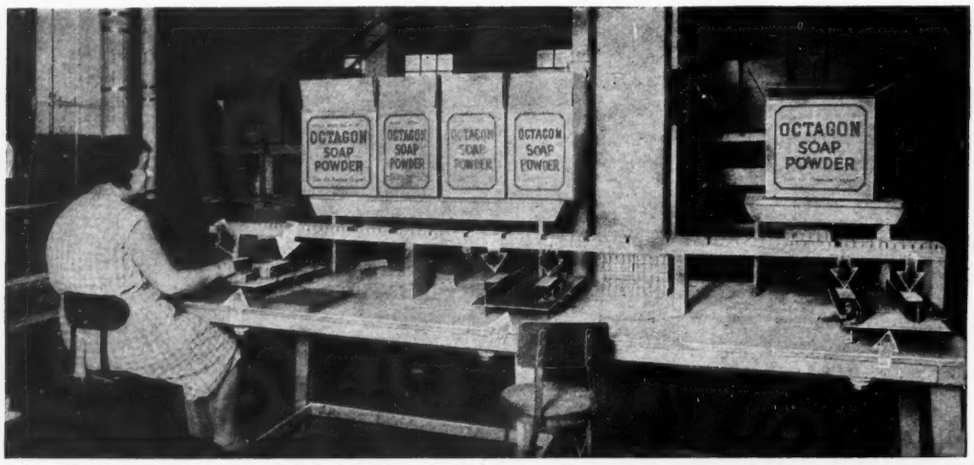
HERE are two examples of the hundreds of ways in which you can use these handy G-E "Spots of Heat" (localized electric heating units).



Three G-E immersion units screwed into an outer tank containing Transil oil furnish heat for the inner tank containing waxes and oils. Used for treating packing-cup discs

They cost very little, are easy to store, can be made to do an amazing number of heating jobs, are easy to apply, and provide clean, safe, concentrated heat just where you want it and as soon as you want it.

They are made in a half-dozen different styles. Ask your nearest G-E office for prices, shipments, and information concerning their application.



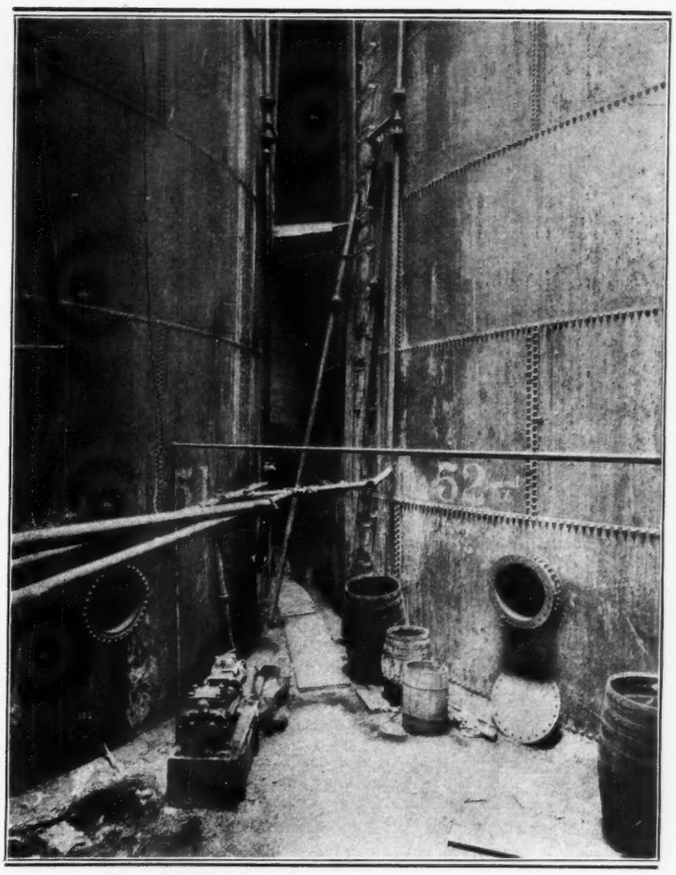
Three package sealers each equipped with two G-E 150-watt cartridge units embedded in brass on each side of sealer and one 300-watt unit embedded in bottom. Packages, wrapped in wax paper, are pushed through the tight-fitting heated frames and sealed by the heat

JOIN US IN THE GENERAL ELECTRIC PROGRAM, BROADCAST EVERY SATURDAY EVENING ON A NATION-WIDE N.B.C. NETWORK

570-154

GENERAL ELECTRIC

SALES AND ENGINEERING SERVICE IN PRINCIPAL CITIES



A pair of 380,000 gallon tanks, by Graver, for vegetable oils. Erected prior to 1885

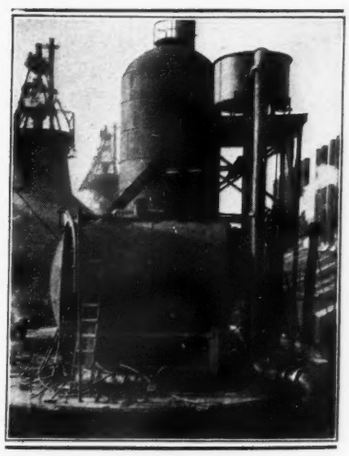
If you need

SPECIAL PROCESS EQUIPMENT OR POWER AUXILIARIES

ASK GRAVER

Modern power plants and modern processing can not use "off-the-shelf" equipment in every instance. The secret of low cost is equipment that is *adaptable to conditions.*

Your power problem or your process needs are less serious when they are properly served by specialized equipment.



Graver Tank & Mfg. Corp. is the largest designer and manufacturer of a complete line of water softening and filtering equipment.

Graver's service to industry in designing and fabricating special steel plate construction for specific needs has proved itself in hundreds of notable cases. Our engineering and fabricating services are *not* "off-the-shelf" services, but are organized to cooperate with you in meeting your requirements, however unusual or severe.

Consult Graver First

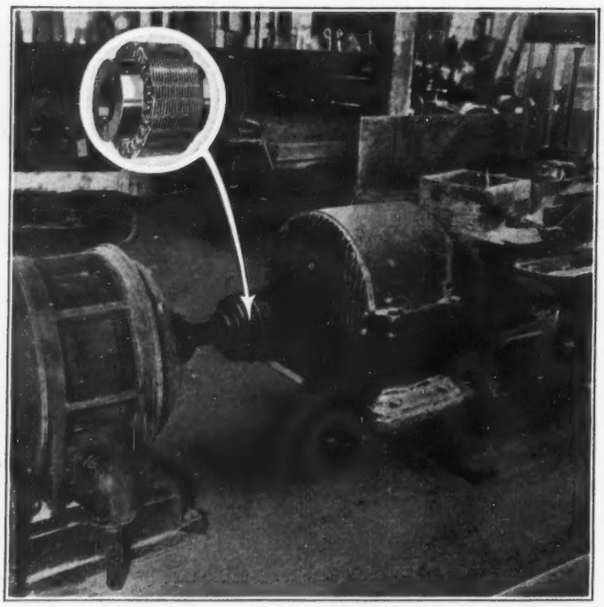
GRAVER TANK & MFG. CORP.
East Chicago, Indiana

Chicago New York Ft. Worth Tulsa

Representatives in other principal cities

GRAVER
STEEL PLATE CONSTRUCTION

MORSE
FLEXIBLE COUPLINGS



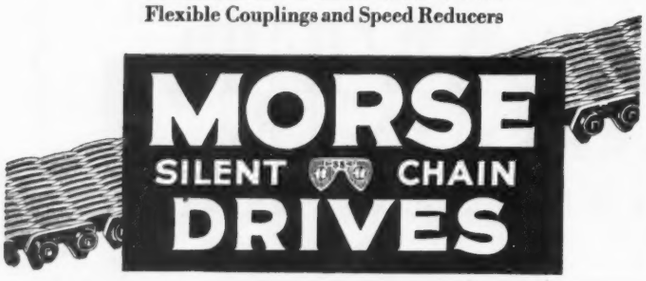
Morse Flexible Coupling connecting motor to Morgan Wire Drawing Bench

FLEXIBILITY AT ITS BEST!

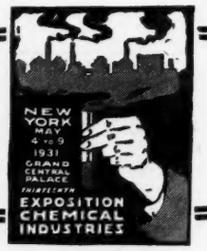
List the important advantages you need in a flexible coupling—you will find them all in the practical, easily installed Morse Flexible Couplings. Flexibility, simplicity, ease of uncoupling, rugged strength, ability to dampen vibration, low first cost, long life—are essential features in coupling operation. You obtain them in Morse Flexible Couplings.

Stock sizes available for immediate delivery. Special sizes for any job. Send for Bulletin No. 37 which gives complete data and prices.

MORSE CHAIN CO. · ITHACA, N. Y.
Division of Borg-Warner Corporation
Branches in Principal Cities
Manufacturers of Morse Chain Drives
Flexible Couplings and Speed Reducers



MIKE* wants to see you . . . at the Chemical Show

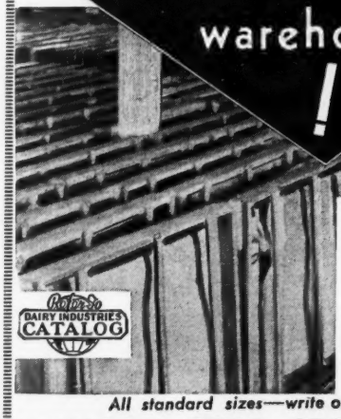


. . . and you want to meet MIKE* . . . anytime . . . anyplace. He's saving thousands of dollars for hundreds of people, every day . . . pulverizing their sugar and other things. A few minutes with MIKE* may save you a whole flock of dollars. If you can't wait for the Show, *send for Catalog 16.*

*MIKE . . . *meaning MIKRO-PULVERIZER, the latest and most effective machine for pulverizing XXXX sugar or other commodities to similar fineness.*

PULVERIZING MACHINERY CO.
30 Church St., New York City

READY NOW
in our
warehouses
!



Hundreds of Jamison and Stevenson Doors, completely built and crated, ready to ship the day your order is received.

All standard sizes—write or wire our nearest branch

JAMISON COLD STORAGE DOOR CO.
CONSOLIDATING JAMISON COLD STORAGE DOOR CO., INC. AND STEVENSON COLD STORAGE DOOR CO.
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OLDEST and LARGEST makers of Cold Storage DOORS

EXTRA VALUE FEATURES AT NO EXTRA COST

Push Button Control
Roller Bearings Throughout
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Outside Adjustments
Double Drive Hoist Gearing
Safest Type Limit Switch
Steel Load Members
Alloy Steel Shafts
Forged Heat-Treated Gears
Gears Run in Oil

ASK FOR BULLETIN 202

TO EXECUTIVES WHO INSIST UPON EXTRA VALUE

and are keen for cutting costs!

HERE is welcome news . . . a product that costs no more yet gives you, as standard, features that are usually "extra".

Make the most critical comparison . . . and you will prove beyond question that "Milwaukee" Electric Hoists are your logical buy.

They lift and move loads from 1/4 to 10 tons . . . quickly and safely. They may be used in connection with a single I-Beam bridge, giving you an inexpensive overhead traveling crane of 5 tons capacity.

Dependable operation is built into "Milwaukee" Hoists by P & H, world's largest builder of cranes and hoists. Would you like to have a crane engineer help you to make a material handling survey of your plant?

Milwaukee Electric Crane & Hoist Division of

HARNISCHFEGER CORPORATION

4507 W. National Avenue **Milwaukee, Wisconsin**

Traveling Cranes up to 300 Tons . . . Low Headroom Cranes 3 to 30 Tons . . . Single I-Beam Cranes ¼ to 5 Tons . . . Monorail Hoists (all types) ¼ to 10 Tons . . . Lumber Cranes . . . Bucket Cranes . . . Corduroy-Crawler Cranes . . . Gantry Cranes . . . Single Line Buckets.

HOISTS MILWAUKEE CRANES ROLLER BEARING CRANES

MILWAUKEE

44% Saved

If you are using single trip packages for shipping liquid or dry bulk materials, let us help you analyze your shipping problems to see if your costs cannot be reduced by using Hackney permanent steel containers. This is a service which we have been giving, without obligation, to thousands of manufacturers during the last 30 years. Below is one example of the savings which we have helped many of them to make in their shipping costs.

EXAMPLE

For three consecutive years (X) spent on an average of $7,750 a year for light weight containers.

The following year, he changed to Hackney returnable steel drums with full removable heads —and his costs immediately dropped to $4,309 —a saving of 44%.

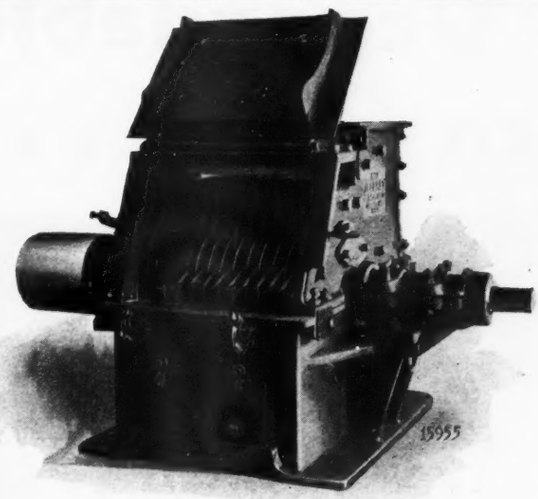
This represented a net saving, as all such costs as depreciation, interest, return freight, cleaning, insurance, extra freight on out-shipments and clerical costs were included in the $4,309.

A Few Prominent Hackney Users

Pittsburgh Plate Glass
Hercules Powder
General Electric
Southern R. R.
Sherwin-Williams
Fairbanks, Morse & Co.
Cook Paint & Varnish
Tanglefoot

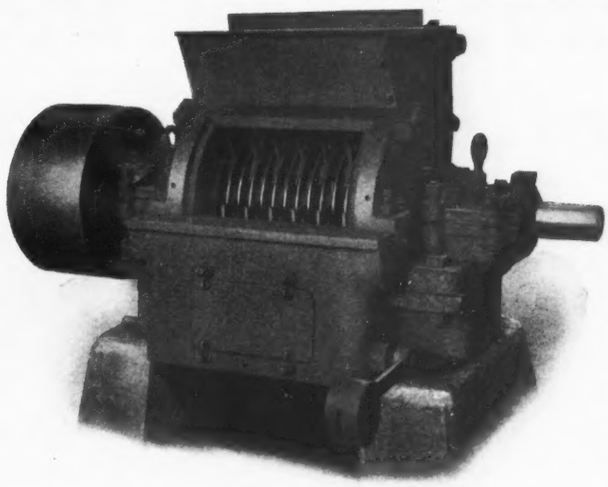
PRESSED STEEL TANK COMPANY
1173 Continental Bank Bldg., Chicago
1349 Vanderbilt Concourse Bldg., New York City
5771 Greenfield Avenue, Milwaukee, Wis.
477 Roosevelt Bldg., Los Angeles

Hackney
MILWAUKEE



Jeffrey Black Gut Hasher

PATENTED



Jeffrey Bone and Meat Hasher

TWO INVALUABLE MACHINES FOR THE MEAT PACKER

The Jeffrey Black Gut Hasher, and the Jeffrey Bone and Meat Hasher are invaluable in the hashing of black gut, cattle-pecks, scrap meat, bones, etc., for further process.

Black gut and cattle pecks must be hashed to relatively large pieces so they can be properly handled in the washer. Hence, the Jeffrey Black Gut Hasher can be operated at a speed to tear the guts into pieces that will wash thoroughly, yet which will not escape through the washer screen. The thorough washing made possible insures a high quality of white grease products.

The Jeffrey Black Gut Hasher will handle any kind of entrails. Pecks and long entrails cannot pass it without being thoroughly hashed.

The Bone and Meat Hasher, on the other hand operates at high speed to produce the finely hashed product needed for cookers and expellers.

Both machines can be furnished in several capacities. Neither can be injured by nose rings, nuts, bolts, etc.

These machines make byproducts more salable—decrease the cost of their preparation.

Jeffrey makes hashers, crushers, pulverizers, for many food plant operations. Send for complete information.

THE JEFFREY MANUFACTURING COMPANY

927-99 North Fourth Street, Columbus, Ohio

New York	Pittsburgh	Cincinnati	Charleston, W. Va.	Houston
Buffalo	Utica	Cleveland	Milwaukee	Salt Lake City
Rochester, N. Y.	Boston	Detroit	St. Louis	Birmingham
Philadelphia	Scranton, Pa.	Chicago	Denver	

Jeffrey Manufacturing Co., Ltd., of Canada, Head Office and Works: Montreal—Branch Office: Toronto

JEFFREY PRODUCTS

Chains—Sprockets—Gears
Elevators—Conveyors
Trolley Conveyors
Portable Loaders
Coal and Ashes Handling Equipment
Crushers—Pulverizers
Foundry Equipment
Sand & Gravel Handling, Washing and Screening Equipment
Locomotives

JEFFREY

MATERIAL HANDLING EQUIPMENT

Economical and Dependable for Quick-Frozen Foods . . .

Leak-Proof, Crush-Proof, Practically Air-Tight, Sealright Paper Containers Are Ideal for Many Cold-Packed Products.

FOR years Sealrights have been recognized as the most economical *dependable* container for fresh-packed moist and juicy foods. And now, because of their many practical advantages, they are being widely used by packers of quick-frozen fruits, vegetables, and other cold-packed products.

Made of pure spruce-pulp paper, thoroughly impregnated with paraffine, Sealrights are sturdy and tight as a drum. They have a patented double bottom for double safety. They positively won't leak, drip or spill. And their snug-fitting cover-all tops (not discs) keep the cold in and the warm air out.

Moreover, nine years of national advertising has taught consumers everywhere the advantages of buying foods in Sealrights. Thus, by adopting Sealrights for your frozen foods, you immediately cash in on the public preference for products packed in these dependable containers.

You may obtain Sealright Containers plain, or colorfully printed to make your package appeal to the eye just as your product appeals to the appetite. Sealrights are available in all standard liquid or dry measure sizes up to 1 gallon or 10 pounds.

Nine years of national advertising has built up a valuable public preference for products packed in Sealrights.

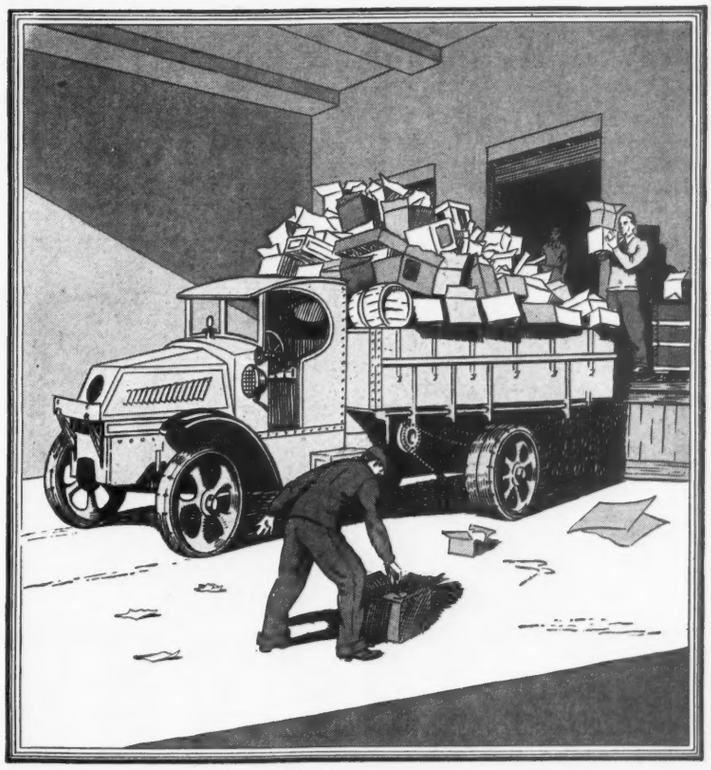
SEALRIGHT

LEAK-PROOF

FOOD CONTAINERS

Write today for free samples and full information. on the advantages of Sealrights. Sealright Co., Inc., Dept. FO-3, Fulton, N. Y. Canadian address: Canadian Sealright Co., Ltd., Peterborough, Ontario.

Storage and
Handling of
Rubbish is a
Fire-Hazard
—and a *Waste*
of Time
—Space
—Money



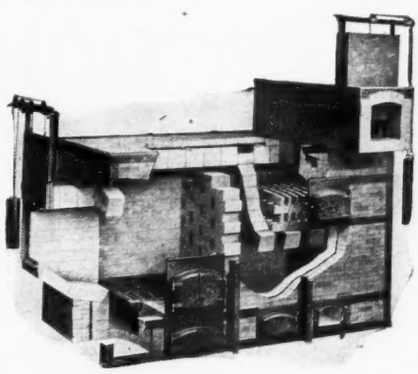
Eliminate this wasteful Hazard—

DON'T let combustible refuse accumulate anywhere in or near your plant! It invites the birth of small fires, feeds the growth of big ones.

It is a waste of space. It clutters up your buildings. Storing rubbish, handling it, loading it out to be hauled away or burned in the yard—all are *wastes* of time, space and money.

A Few Typical Installations

Great A. & P. Tea Co.	(In 13 Cities)
Horn & Hardart	Philadelphia
Crosse & Blackwell, Inc.	Baltimore
Nathan Schweitzer	New York
General Baking Co.	Washington
Tasty Baking Co.	Philadelphia
Dugan Brothers Bakéries	New York
J. B. Blood Market	Malden, Mass.
Detroit Union Prod. Terminal	Detroit
E. H. Wiener Co.	Akron, O.
Land-O-Lakes Creameries	Minneapolis
Atlantic Coast Fisheries	New London



INCINERATION is the modern method. Prompt, safe, economical disposal in a heavy-duty Morse Boulger Destructor — designed and built especially for the purpose, by experienced men who *know* waste-burning; operating at low maintenance cost without smoke or nuisance of any kind.

All your refuse burned *before* it has a chance to accumulate and become a danger or a waste of time and space! One great national concern operates *thirteen* Morse Boulger Destructors in its warehouses and bakeries all over the country.

May we send you detailed information, without obligating you in any way?

Production Refuse, too

Heavy bakery garbage, spoiled food products, canning refuse —Morse Boulger Destructors are daily handling all of these and many other special industrial wastes.

. . .

Operation is effective — economical — trouble-free. Combustible rubbish usually serves as fuel to consume wet matter.

. . .

Each installation is designed for its particular duty, with a technical and practical knowledge gained by thirty-five years of experience covering every conceivable kind of waste.

. . .

If you have a difficult disposal problem, investigate incineration. Let us figure what it can do for you.

HEAVY-DUTY INCINERATION
MORSE BOULGER DESTRUCTORS
MORSE BOULGER DESTRUCTOR COMPANY, INC.
205F East Forty-Second Street, New York, N. Y.
Competent representatives everywhere for your convenience

PRODUCT IS KNOWN BY IT QUALITY KEEPS

KEEP in the quality you **pack** in. Retain all the original aroma and taste; protect it all the way to the buyer's table. This is the final test of Quality and Profit.

AND BOTH DEPEND ON THE WRAPPER!

Today markets reach farther than ever. Yet both distance and time are overcome by the use of KVP Protective Papers.

They render the most varied and exacting types of service to the satisfaction of leaders in all lines of food industry.

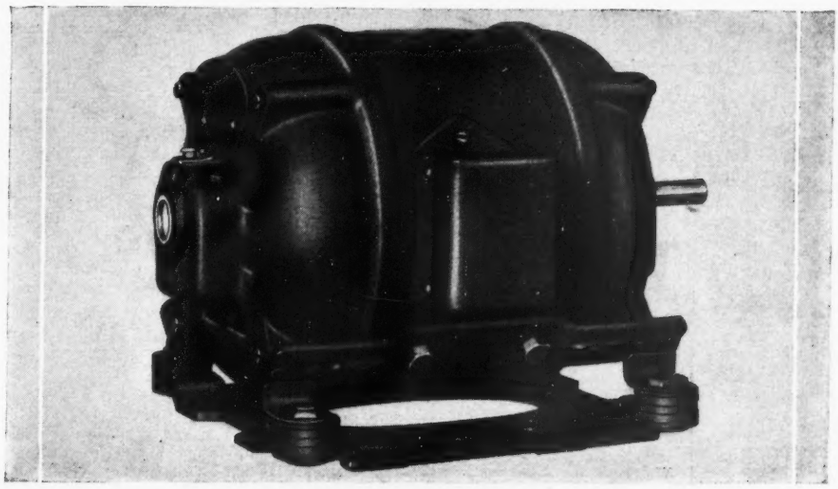
Whatever your need, you may entrust your **quality** to KVP Papers. They guard against loss of flavor and outside taint. They are odorless, tasteless and resistant to water, grease and oil.

Let KVP research engineers advise as to the best type of wrapper for your special needs. Write for information and samples.

Kalamazoo Vegetable Parchment Co.
KALAMAZOO - MICHIGAN

KVP
PROTECTION PAPERS

THEY KEEP A-RUNNING



1/6 Horse Power Century Type RS Repulsion Start Induction Single Phase Motor

RUBBER MOUNTED
FOR QUIET OPERATION

Where noise and vibration must be kept at a minimum and localized—as in electric refrigerators, oil burners and similar installations—the combined advantages of both spring and rubber mounting provided by these motors makes them particularly suitable . . . The quiet operation of Century Type RS Motors is further assured because they are of the brush-lifting type—the brushes ride the commutator only during the starting period; about 1/900th part of the time the motor is in operation.

Century Repulsion Start Induction Single Phase Motors are built in all standard sizes from 1/8 to 40 horse power.

CENTURY ELECTRIC COMPANY
1806 PINE ST. · · ST. LOUIS, MO.
40 U. S. and Canadian Stock Points and More Than 75 Outside Thereof

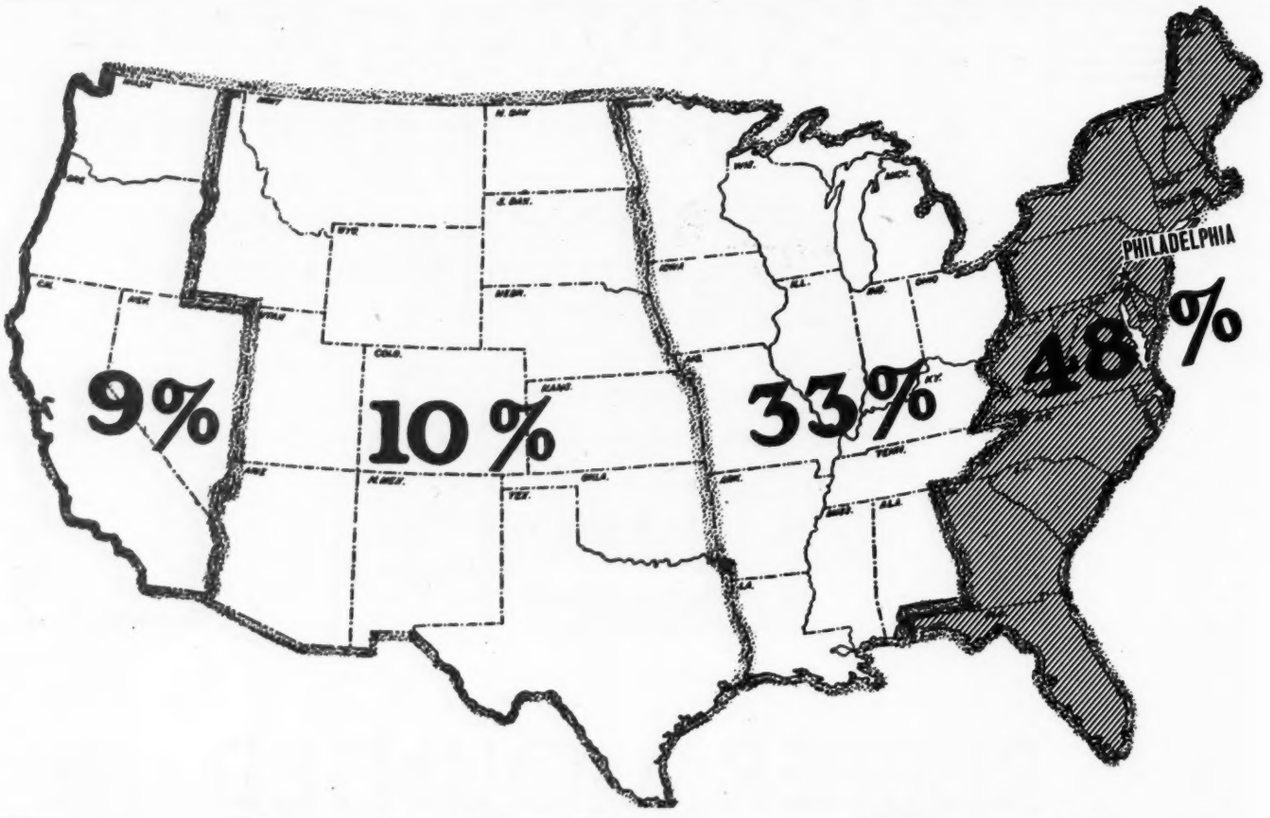
SINGLE PHASE, THREE PHASE, AND DIRECT CURRENT MOTORS

Century MOTORS

MOTOR GENERATOR SETS, ROTARY CONVERTORS, FANS AND VENTILATORS

RS-2-1/6

FOR MORE THAN 27 YEARS AT ST. LOUIS



For Quick Distribution

THE Atlantic States, shown by the shaded portion of the map, represent a spendable income of $45,802,804,000—48% of the country's total. This vast spendable income centers at a point thirty-eight miles northwest of City Hall, Philadelphia. Every dollar of this spendable income is reachable at an average distance of only 185 miles from Philadelphia.

Why not take advantage of this concentration by locating in the midst of it? By locating in Philadelphia you will be in the best position to reach the 134,537 independent grocery stores (45% of the total), 27,418 chain grocery stores (55% of the total) and 35,305 restaurants (35% of the total) in this area.

Philadelphia's no-lighterage port affords every advantage of water transportation, including service to the Pacific Coast via the Panama Canal. All materials for preparation and packaging are immediately available at favorable prices.

Data relating specifically to Philadelphia's opportunity for your business will be submitted without cost or obligation. Please address Department O. on your business letterhead.

Transportation Facilities in the Philadelphia Area
Distribution and Production in the Philadelphia Area
Power Resources in the Philadelphia Area
Labor and Human Resources in the Philadelphia Area

Any of these free booklets may contain the key to your door of opportunity.

PHILADELPHIA

Business Progress Association

1442 WIDENER BUILDING **PHILADELPHIA**

Countless Units identical in quality...

The result of uniformly controlled temperature and pressure conditions

ELIMINATION of many evils attendant with "old-standard" processing methods has been accomplished by leading food products manufacturers with the aid of modern instrument equipment.

RECORDING THERMOMETERS, RECORDING PRESSURE GAUGES and AUTOMATIC TEMPERATURE AND PRESSURE CONTROLLERS now ensure maintenance of exactly the right temperatures and pressures at every stage of sterilizing, cooking, etc.—preventing overheating or underheating . . . cutting down waste . . . saving time . . . increasing production . . . and SAFEGUARDING QUALITY.

In adapting Bristol's Instruments to your particular requirements, The Bristol Company maintains a nation-wide Field Engineering Service—a service that will be placed at your disposal entirely without obligation. For further information, or request for consultation, write direct to THE BRISTOL COMPANY at Waterbury, Conn., or to nearest Bristol's branch office.

BRANCH OFFICES:

Boston	Akron	Chicago	Denver
New York	Pittsburgh	Detroit	St. Louis
Philadelphia	Birmingham	Los Angeles	San Francisco

BRISTOL'S
SINCE 1889
Instruments *for* Indicating Recording Controlling

Bristol's Recording Thermometer. Moisture-proof case. Inverted pen-arm. Ranges up to 1000° F.

Bristol's Recording Pressure Gauge. Can be furnished in moisture-proof case.

Bristol's Thermometer Controller. Furnished to operate over desired control ranges up to 1000° F.

Bristol's Single Service Distance Type (air operated) Temperature Controller.

CITRIC ACID

Merck's Citric Acid is the Gold Medal Standard for food, confectionery and beverage products. We have had 58 years of experience in the manufacture of this article . . . Merck's Citric Acid is supplied in the crystal, granular and powder forms . . . Shipped in kegs, barrels or carloads . . . Also Lactic, Tartaric, Phosphoric and other acids . . .

Elliott Cresson Gold Medal awarded for perfection of product.

SODIUM BENZOATE

Merck's Sodium Benzoate is white, clearly soluble, and free from foreign odor or taste . . . Approved by the manufacturers of delicately flavored products . . . . . .

METHYL SALICYLATE

One of Merck's "taste-like-more" flavors for fine confectionery, extracts, birch beer and other food products . . . Imparts the true flavor of Wintergreen . . . Our facilities are unlimited. Stocks fresh and pure. Put up in convenient 50 lb. tins or larger . . .

CREAM OF TARTAR

MILK SUGAR

VANILLIN

and many other products

FOR DAIRY CONTROL

Our Ether Concentrated and Benzin Purified are especially designed for large-scale fat determinations in the control of dairy products . . . .

The services of our Sales Organization and the scientific resources of our laboratories are at your disposal in the selection of products adapted to your needs.

MERCK & CO.

INC.

MANUFACTURING CHEMISTS

Industrial Division: 916 Parrish St. Philadelphia — RAHWAY, N. J. New York — St. Louis — In Canada: MERCK & CO. LTD. Montreal

This THERMOMETER Does Make Profits For YOU

Catalog FI331 may be had on request

Accurate temperature, durable construction, and a dial so clear that it can be read correctly, even from a distance, are, after all, what you want from a thermometer.

This modern Motoco Industrial Thermometer provides them all. It registers the correct temperature as a matter of course. Its bold black-and-white dial and brilliant red pointer are plainly readable 20 feet away. When desirable, it may be installed upwards of 50 feet from where the temperature actually is taken . . . permitting you to mount all your gauges on one central control panel.

Motoco instruments of similar design and capabilities are available for temperatures ranging from −40° to +750° F.

Our representative will gladly go over your thermometer problems with you, and point out how the Motoco's *greater efficiency* will bring *greater profits* to your company.

Moto Meter also manufactures a complete line of vacuum and pressure gauges

MOTO METER

GAUGE & EQUIPMENT CORPORATION

TOLEDO, OHIO

FACTORIES AT TOLEDO • LA CROSSE • CANADA
ENGLAND • FRANCE • GERMANY • AUSTRALIA

HE SPECIALIZES *in "Packaging to Sell"*

ARE you sure your present package is helping you to speed up your sales?

In this era of keen merchandising when better packaging means so much in increased sales, you'll find it to your advantage to discuss your "packaging to sell" problems with the Continental Representative.

He will bring you many years of experience gained while helping solve the packaging problems for manufacturers in many diversified businesses. He is conversant with all the phases of modern package design. He can help you in many ways.

He represents the tremendous resources of the Continental Organization — 38 Plants conveniently located in 24 cities — completely equipped research laboratories — a skilled organization of engineers and designers — all ready to serve you.

"IT'S BETTER PACKED IN TIN"

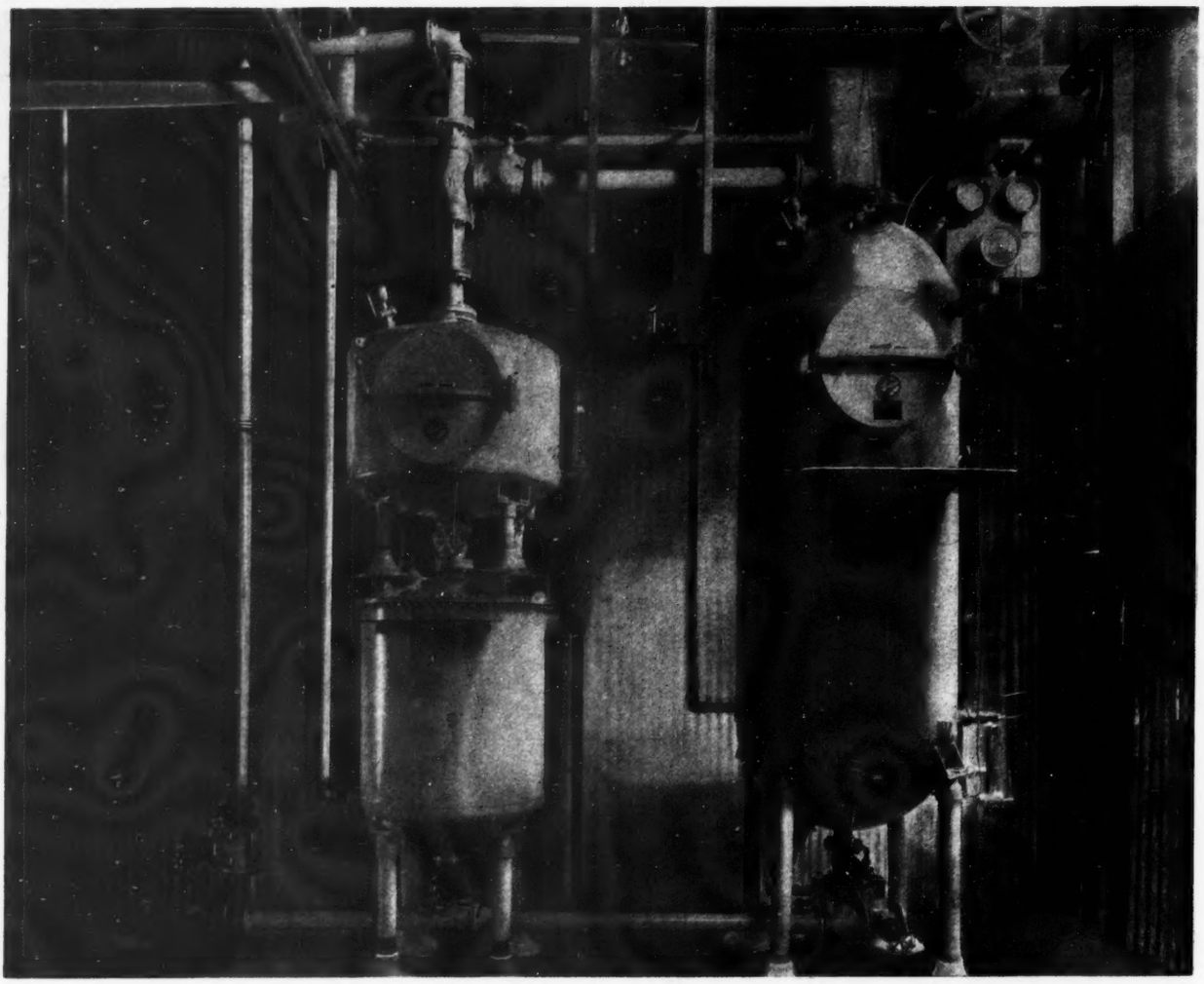
Wherever you are, the services of the Continental Representative are at your disposal.

CONTINENTAL CAN COMPANY INC.

Executive Offices: NEW YORK: 100 East 42nd St. CHICAGO: 111 West Washington St.
SAN FRANCISCO: 155 Montgomery St.

PRESERVED ORANGE JUICE THAT TASTES LIKE THE ORIGINAL ~ ~ *New*

Pfaudler Fruit Juice and Ester Impregnating System



Pfaudler Concentrating and Ester Impregnating System for the concentration of orange juice without destruction of any of the delicate flavors—Dilpako Packing and Canning Co., Clearwater, Fla. They write—"Fruit products in concentrated form show splendid color—all flavors retained in their entirety."

A Remarkable Discovery in the art of preserving fruit juices so that the major portion of the delicate aromas are retained, is offered to the preserving industry by The Pfaudler Company. The system is very simple insofar as the principles governing the maximum retention of flavoring ingredients are concerned. It differs completely from any other known system in practical operation to date. Send for new Pfaudler Vacuum Pan Hand Book, No. 726l

THE PFAUDLER CO., 1510 Gas & Elec. Bldg., Rochester, N.Y.

NEW YORK 8 W. 40th St. | ELYRIA, O. Pfaudler-Elyria Div. | CHICAGO 1422 Conway Bldg. | SAN FRANCISCO 122 New Montgomery St. | LOS ANGELES 1855 Industrial St.

Pfaudler

Glass Lined Steel Equipment

One man handles them easily!

"Jim, come lend me a hand!"

That is never said when the containers to be handled are *Wooden Barrels*. Wooden barrels are one-man-handled containers, no matter how heavily filled.

And Wooden Barrels furnish their own trucking facilities. Being round, they are easy to roll. The bilge makes them easy to guide, and to upend. Fewer men can handle more freight packed in barrels than in any other form of container.

They are also the easiest container to fill and to empty. They are clean, made of clean, fresh wood, and give the utmost sanitation.

The round design and the curve of the bilge make the blows and bumps of rough handling glance off wooden barrels. Made up of staves and heads bound together into a unit by external pressure, no container has the resilience, the springiness of the wooden barrel to absorb and modify the bumps received in transit.

Pack your products in tight or slack wooden barrels and they will be protected against spoilage, deterioration, atmospheric changes, contamination. Write for data.

THE ASSOCIATED COOPERAGE INDUSTRIES OF AMERICA
Railway Exchange Building, St. Louis, Missouri

These and many other products can be packed in TIGHT barrels.

Beverages	Mustard
Butter	Olive Oil
Buttermilk	Oysters
Cider	Pickled Meats
Condensed Milk	Pickles
Cooking Oils	Pork
Extracts	Sirup
Fish	Soda Fountain Sirups
Glucose	Soups
Grape Juice	Strawberries, etc. (Cold Pack Method)
Kraut	Tallow
Linseed Oil	Tomato Pulp
Maraschino Cherries	Vinegar
Mincemeats	
Molasses	

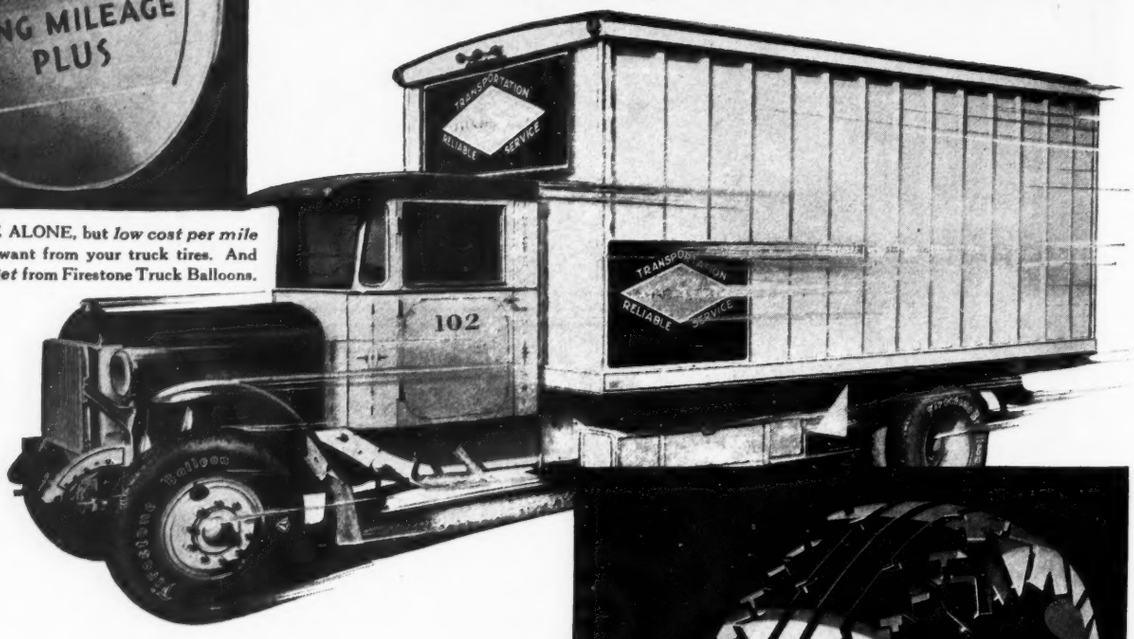
These and many other products can be packed in SLACK barrels.

Fruits	Gelatine
Baking Powder	Glucose
Breakfast Foods	Mustard (dry)
Butter	Meal
Candy	Meat
Cereals	Oleomargarine
Cocoa	Pecans and other nuts
Coffee	Powdered Milk
Cranberries	Poultry
Evaporated Fruits and Vegetables	Sugar
Fish	Salt
Flour	Spices
	Vegetables

WOODEN BARRELS

TRUCK MONEY GOES *FURTHER* ON FIRESTONES

NOT MILEAGE ALONE, but *low cost per mile* that's what you want from your truck tires. And that's what you *get* from Firestone Truck Balloons.



That investment of yours in trucks—are you getting the most out of it? In mileage? In low cost per mile? In less wear and tear on the vehicle itself?

If you're not *SURE,* it will take only a few minutes of your time to find out. And may be worth many dollars.

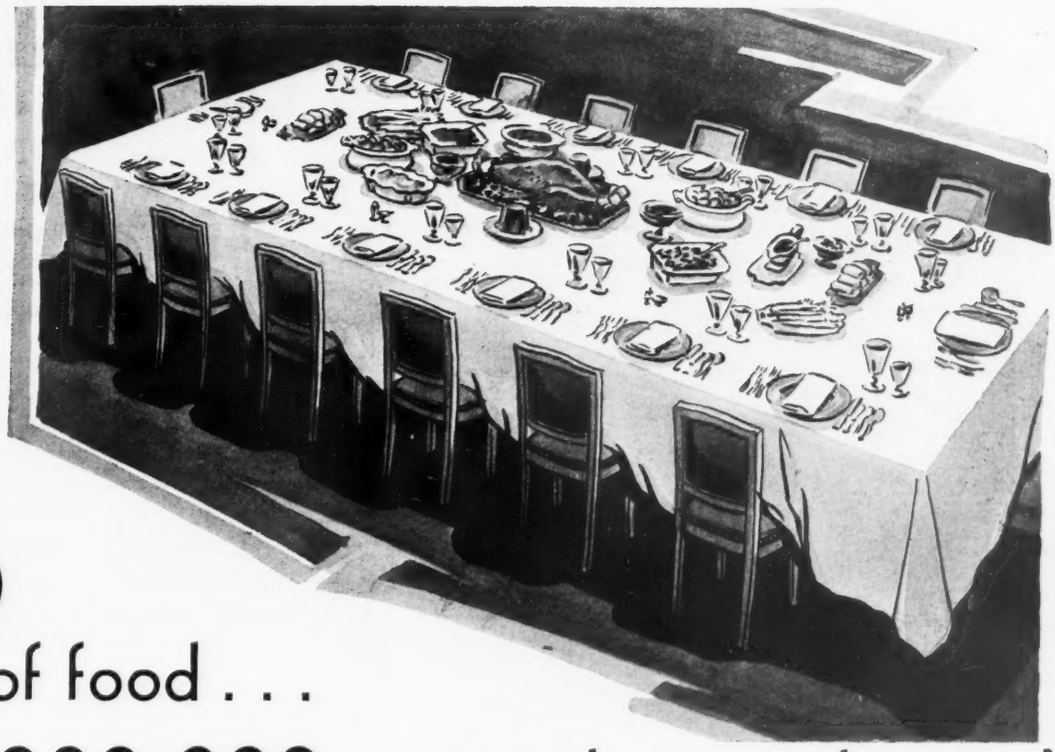
Simply see your Firestone Dealer. He'll tell you if you can profit by changing to Firestone Truck Balloons. He'll give you exact types and costs. You can see for yourself!

Specify Firestone Tires, Firestone Puncture-Proof Tubes, and Firestone Rims when purchasing new equipment.

Firestone

TRUCK BALLOONS

BATTERIES ▪ BRAKE LINING ▪ RIMS ▪ ACCESSORIES



$100 worth of food . . . $100,000,000 invested to produce it!

Take **any** hundred dollars' worth of assorted food products (it doesn't have to be the inventory of a banquet table), trace each item back to its source, and the trail will usually lead to a great industrial establishment.

The Manufacture of Foods is one of the very largest of all industries—and logically so, since it supplies man's prime need. Regardless of business conditions, we must eat—and the food requirements of 122,000,000 people are tremendous. In good times or bad, the average family spends more for food than for any other single budget item. The bottom never drops out of the food market.

The annual production value of Manufactured Foods in this country exceeds $11,700,000,000, according to the U. S. Census of Manufactures. Of this total, a few more than 10,000 plants produce 89.4%—an average of about $1,000,000 per year for each of these super-plants.

The needs of these 10,000 plants in materials, supplies and equipment are prodigious. Their purchase orders amount to more than seven billion dollars yearly.

This is the FOOD INDUSTRIES market. FOOD INDUSTRIES covers the production executives and buying factors of the largest plants in every branch of Food Manufacture with more than 7500 paid subscriptions.

If you sell a product that Food Manufacturers can profitably use, FOOD INDUSTRIES is **your** advertising medium—the only publication that can give you reader-attention throughout the entire Food Field. Ask us for the details.

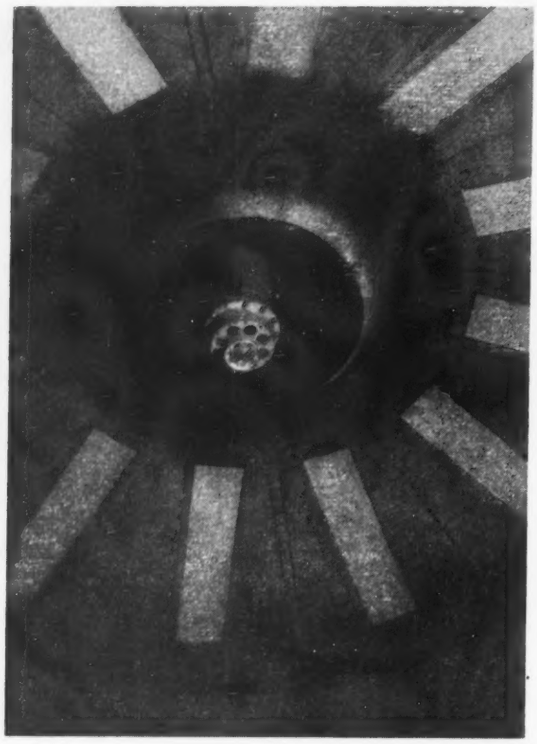
This "Fact-Picture of the Food Field" contains much helpful information. Ask for your copy.

THERE IS NO BUSINESS MORE FUNDAMENTAL THAN THE

FOOD INDUSTRIES

McGRAW-HILL PUBLISHING COMPANY, INC., TENTH AVENUE AT 36th STREET, NEW YORK

Unit Spray-Drying



Take an old product and make it new by Unit Spray-Drying. You can do this easily and at moderate first cost. Your initial capital risk will not be great and your equipment can grow with the market for your product . . . *Now a New Product with a New Market.*

High speed, motor driven disc atomizers are used in our Unit Spray Driers. These atomizers are simple, have a long life, and will atomize anything that can be pumped through an 1½" pipe. Sludges, slurries, solutions, suspensions . . . are all alike to these atomizers. Fibres make no difference either. A valuable *New Product* awaits you.

We will gladly furnish additional information about UNIT SPRAY DRIERS if you will write us.

UNIT SPRAY DRIERS

TYPE A $7500

F. O. B. Garwood, N. J.

BOWEN RESEARCH CORPORATION,
117 LIBERTY STREET, NEW YORK

PLANT CLEANLINESS BEGINS WITH FUMIGATION!

USE **LARVACIDE** (Chlorpicrin) REGISTERED

Sterilize as you will, if your plant still contains insect pests it is far from being clean. Periodical fumigation with this safe, sure killing agent will do more toward sterilizing your products than any other form of cleanliness. Clean basic elements mean clean products.

***Send for descriptive folder on plant fumigation with* LARVACIDE**

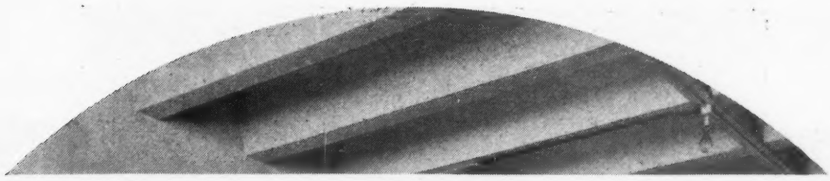
ISCO CHEMICALS

INNIS, SPEIDEN & CO. INCORPORATED
117-119 LIBERTY STREET, NEW YORK.

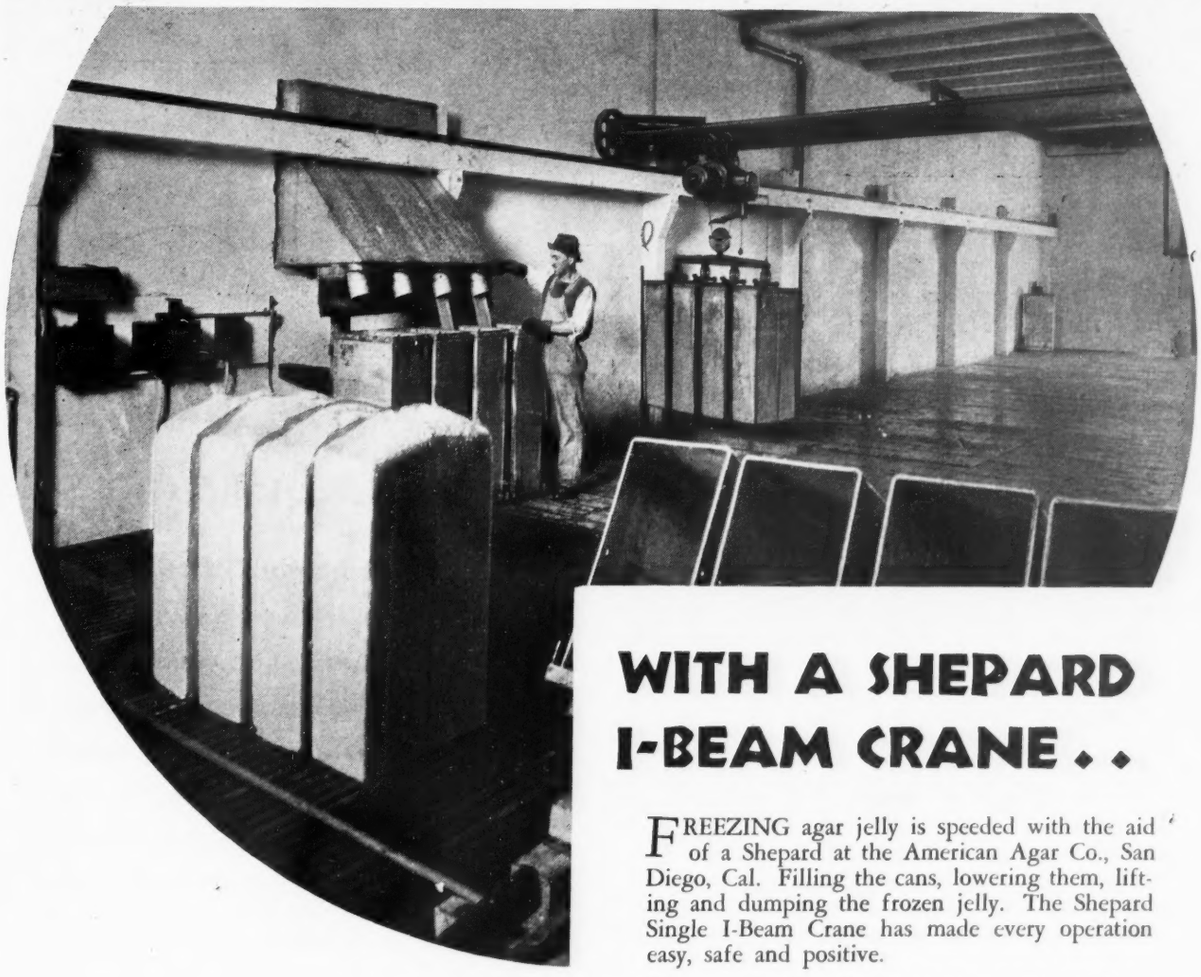
LARVACIDE SERVICE, INC.

NEW YORK KANSAS CITY CHICAGO

TAGLIABUE N.Y.
240 F 220
F 230
RECORDERS
DIAL-INDICATING THERMOMETERS
CONTROLLERS
OIL-TESTING INSTRUMENTS
Put a TAG Recorder-Controller in charge
YOU will be served with the touch of a wizard, strong and cunning, gifted with an unfailing memory. The temperature of your cooker will be held exactly where you want it. It will provide you with a written chart to show not only what the controller did, but also what was done or left undone by those responsible for the cook.
The story in detail is contained in Catalog No. 440-2. Send for it!
C. J. TAGLIABUE MFG. CO.
PARK AND NOSTRAND AVES., BROOKLYN, N.Y.
Instruments for Indicating, Recording and Controlling
BRANCH FACTORIES
CLEVELAND, OHIO SAN FRANCISCO, CALIF. SHREVEPORT, LA.



FASTER, MORE ECONOMICAL HANDLING



WITH A SHEPARD I-BEAM CRANE . .

FREEZING agar jelly is speeded with the aid of a Shepard at the American Agar Co., San Diego, Cal. Filling the cans, lowering them, lifting and dumping the frozen jelly. The Shepard Single I-Beam Crane has made every operation easy, safe and positive.

This accurate handling is lasting. It is made so by such features of Shepard design as the "Balanced" drive, automatic oil bath lubrication, permanent alignment, total enclosure and proper control.

No matter what the load handling need may be Shepard can supply the hoist or crane of the exact speed, capacity and type. The aid of Shepard engineers is freely offered to make certain that the proper machine is specified for any overhead load-handling need.

Member EMA Electric Hoist Manufacturers Association

SHEPARD NILES CRANE & HOIST CORP.

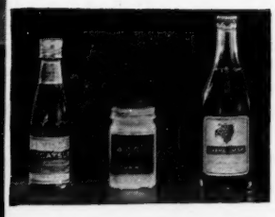
Main Office 422 Schuyler Avenue, Montour Falls, N. Y.

Works: Montour Falls, N. Y., and Philadelphia, Pa.

SHEPARD
CRANE & HOIST DIVISION

THE MOST COMPLETE LINE OF CRANES AND HOISTS IN AMERICA

SEE
WHAT YOU BUY



BUY
IN GLASS

A quality control conference in the History & Specifications Department of one of our plants. These meetings are held every morning by the men in charge of each job.

Guarding QUALITY

' ' ' to DECREASE your packaging costs

' ' ' to INCREASE your sales

The reputation for uniform quality enjoyed by Owens-Illinois glass containers imposes a heavy obligation upon the organization that makes them.

This obligation is made possible of fulfillment by two great interlocking systems of quality control. One is our industrial laboratory at Alton, Illinois, where large-scale tests are made to determine the best materials and machinery for the manufacture of our glassware.

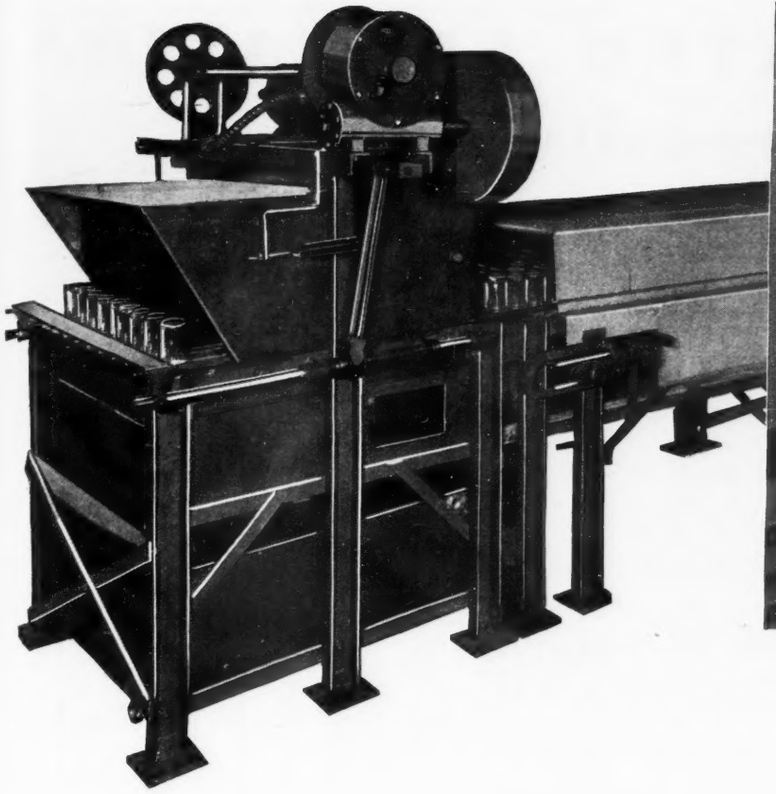
The other is the network of History & Specifications departments operating in each of our plants. The function of each History & Specifications department is to control quality *during the actual manufacture of the container* and to so cooperate with every inspection service as to insure that the finished containers will meet our customers' and our own specifications. Owens-Illinois Glass Company, Toledo, Ohio.

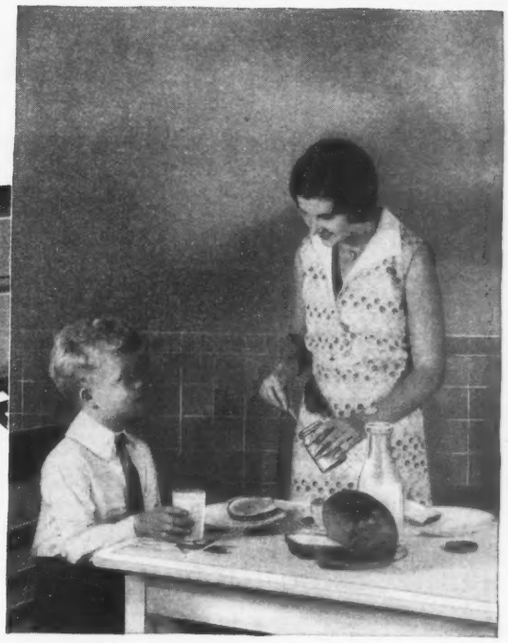
Write for our new booklet "Guardians of Quality In Your Glass Containers." It shows you how we are continually working to produce better and better containers for your product.

BRANCH OFFICES—ATLANTA, Ga., *1001-2-3 Norris Bldg.* - - BALTIMORE, Md., *1501-2 Bromo-Seltzer Tower Bldg.* - - BOSTON, Mass., *430 Park Square Bldg.* - - BUFFALO, N. Y., *1133-5 Marine Trust Bldg.* - - CHICAGO, Ill., *402 West Randolph Street* - - CINCINNATI, Ohio, *800-4 East Third Street* - - CLEVELAND, Ohio, *218 Engineer's Bldg.* - - COLUMBUS, Ohio, *Southwood and 19th Streets* - - DALLAS, Texas, *407-8 Mercantile Bank Bldg.* - - DENVER, Colorado, *306-7 Jacobson Bldg.* - - DES MOINES, Iowa, *330-1 Insurance Exchange Bldg.* - - DETROIT, Michigan, *3-112-113 General Motors Bldg.* - - INDIANAPOLIS, Ind., *1233 Meyer-Kiser Bldg.* - - KANSAS CITY, Mo., *2114 Central Street* - - LOS ANGELES, Cal., *306-7 Western Pacific Bldg.* - - MEMPHIS, Tenn., *1004 Dermon Bldg.* - - MILWAUKEE, Wis., *301 Watkins Bldg.* - - NASHVILLE, Tenn., *1005 Stahlman Bldg.* - - NEW ORLEANS, La., *608-10 Tulane-Newcomb Bldg.* - - NEW YORK, N. Y., *1605-10 Park Murray Bldg.* - - PHILADELPHIA, Pa., *925-27 Public Ledger Bldg.* - - PITTSBURGH, Pa., *1507 Arrott Bldg.* - - ST. LOUIS, Mo., *1402 Landreth Bldg.* - - ST. PAUL, Minn., *Robert and Indiana Streets* - - SALT LAKE CITY, Utah, *308 Dooly Bldg.* - - SAN FRANCISCO, Cal., *401 Young Bldg., 133 Kearney St.* - - SEATTLE, Wash., *905-6 Dexter-Horton Bldg.* - - TOLEDO, Ohio, *965 Wall Street*

OWENS - ILLINOIS

GLASS CONTAINERS





Some time ago we asked food packers which of the two available methods of cleaning containers the modern housewife would prefer—air blast or thorough washing.

HERE IS THE ANSWER

The fully automatic, U. S. Cascade Washer and Dryer insures absolute container sanitation at low cost and high efficiency. Subjects each container to air blast, thorough washing inside and out, and complete drying. Handles any wide mouth jar, bottle, tumbler, or can. Remarkably large capacity.

The housewife will tell you that there is no substitute for thorough washing with plenty of water. If you add to that a system of drying your containers in a sterilizing temperature, you have fulfilled the requirements she instinctively expects of your packing methods. Anything less would lessen her confidence in you and your product. U. S. Engineers are prepared to show you how your plant may be made both more efficient and more economical of operation by the use of U. S. Cascade Washers and Dryers at the head of your filling line. Such information will cost you nothing and will place you under no obligation.

U.S. BOTTLERS MACHINERY CO. INC.

Bottling and Packaging Engineers

4015-31 No. Rockwell St. - - - - Chicago. Ill.

CONCENTRATED EDUCATION *in* Food Processing

TO know what the Food Industries are going to do, you must know the factors which will influence production and selling methods and costs. You can see for yourself what these factors are by visiting the coming Exposition of Chemical Industries.

The equipment which affects the methods and costs of processing; new materials which may supplant those which you are now using; new uses for by-products; improved containers and packages which enhance salability; instruments and supplies which aid in control, operation and maintenance—these are but a few of the items that will be exhibited at Grand Central Palace, New York, the Chemical Capitol of the World, during the first week in May.

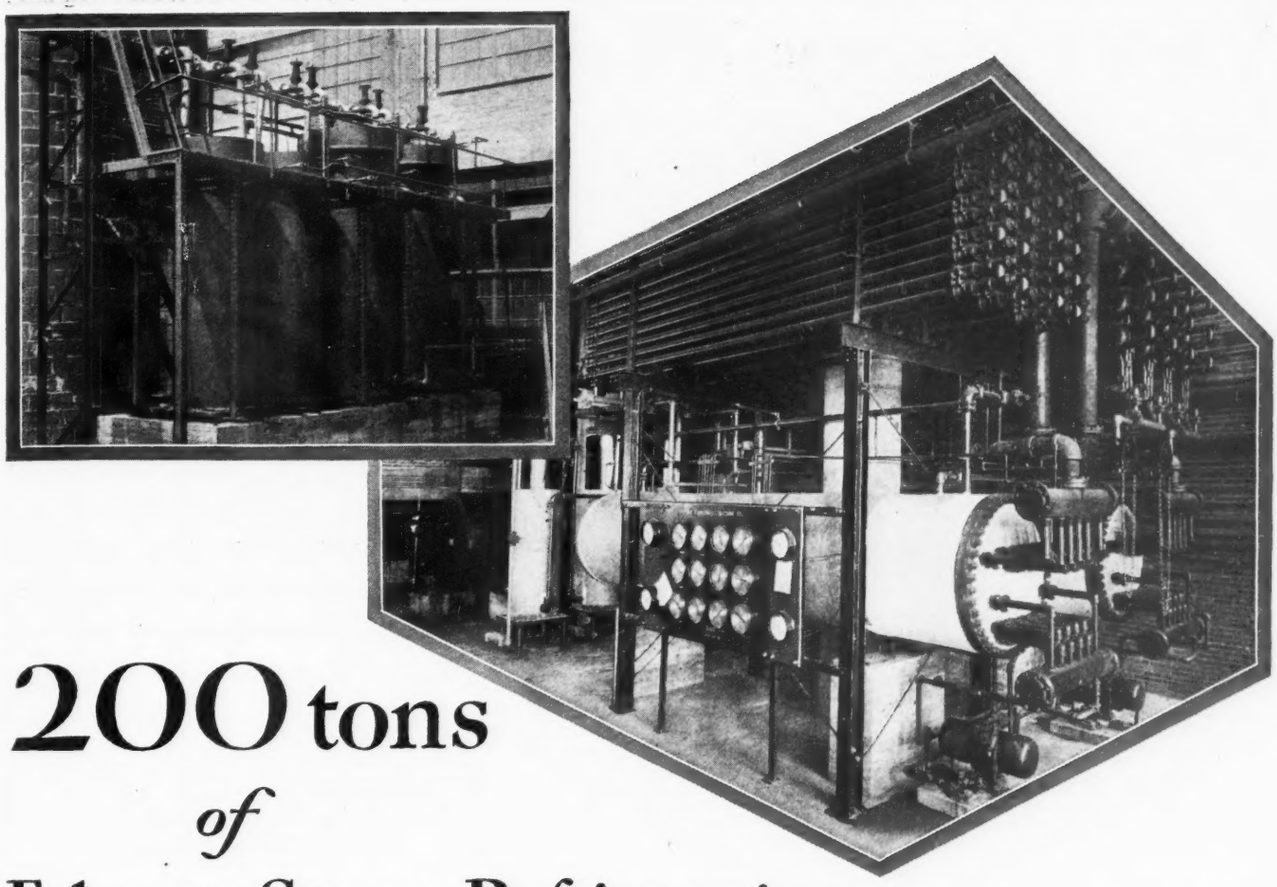
Don't miss the opportunity to absorb this concentrated education in important phases of your own business.

Come and bring your associates.

13th Exposition CHEMICAL INDUSTRIES

Management International Exposition Company

5616A



200 tons *of* Exhaust Steam Refrigeration *aids National Candy Manufacturer*

RELATIVE humidity must be maintained precisely as required in the various processes of candy manufacture. At the National Candy Company, Carbondale Exhaust Steam Refrigerating Machines play an important part in this essential.

Exhaust steam taken from their unaflow engine driven electric generating units provides the power. The two 100 ton Carbondale exhaust steam refrigerating machines cool brine which is circulated through air washers throughout their eight story building.

Ample refrigeration is assured, always. And absorption refrigeration is both silent and inexpensive. Less than $\frac{1}{3}$ mechanical horse power per ton of refrigeration, to operate brine, ammonia and water pumps is all that's needed—exhaust steam does the rest.

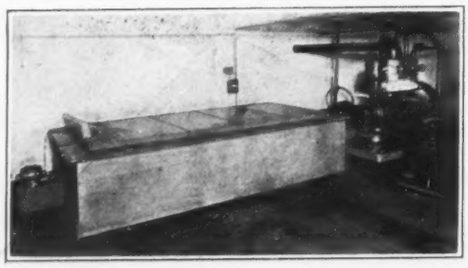
The cooperation of Carbondale engineers—the benefit of more than 35 years of experience in applying refrigeration to practically every need—is freely offered.

THE CARBONDALE MACHINE CO.
CARBONDALE, PA.
Branches in Principal Cities

Carbondale CARMACO ***Refrigeration***

ABSORPTION AND COMPRESSION MACHINES

CARBONDALE AMMONIA COMPRESSION REFRIGERATING SYSTEMS USE WORTHINGTON "FEATHER VALVE" COMPRESSORS



Frick Ammonia Compressor and Kolbe Quick-freezer for Shrimp; Galveston Bay Fishing Co., Galveston

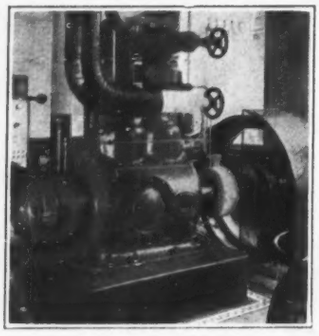
FRICK

Refrigeration

For All Quick-freezing Plants

Quick-freezing Tunnels at Plant Packing Tree-ripened Georgia Peaches

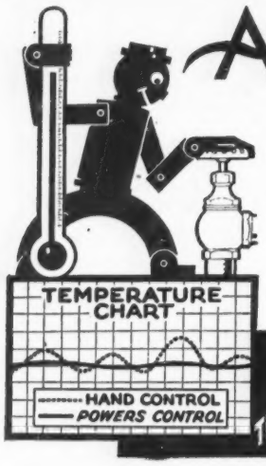
Having furnished Frick Refrigerating Equipment for many of the pioneer quick-freezing plants, we can offer recommendations and estimates to those entering this field, with the confidence born of successful experience. Branches and Distributors everywhere. Write today.



Frick CO_2 Compressor Holding Temperature of 35 degrees below Zero, in Quick Hardening Tunnels for Ice Cream

Frick Company
WAYNESBORO, PA., U.S.A.
ICE MACHINERY SUPERIOR SINCE 1882

Automatic Temperature Control



TO ERR IS HUMAN—to eliminate the occasional errors of hand control of temperature with the mechanical accuracy of a Powers Regulator not only speeds up production—but secures a still better and more uniform product. Let our engineers study your problems of temperature control and recommend the type of regulator that will give best results at lowest cost.

CHICAGO—2727 Greenview Ave. NEW YORK—231 E. 46th St.

Offices in 41 Cities

THE POWERS REGULATOR CO.
OFFICES IN 40 CITIES
40 YEARS OF SPECIALIZATION IN HEAT CONTROL

A few of your minutes . . . a couple of your dollars . . . and this vital publication is yours . . . REGULARLY

FOOD INDUSTRIES—10th Ave. at 36th St., N. Y. C.

Please enter my subscription to FOOD INDUSTRIES for ☐ 2 years—$3. ☐ 1 year $2.

Name .....

Title.....

Company .....

Address.....

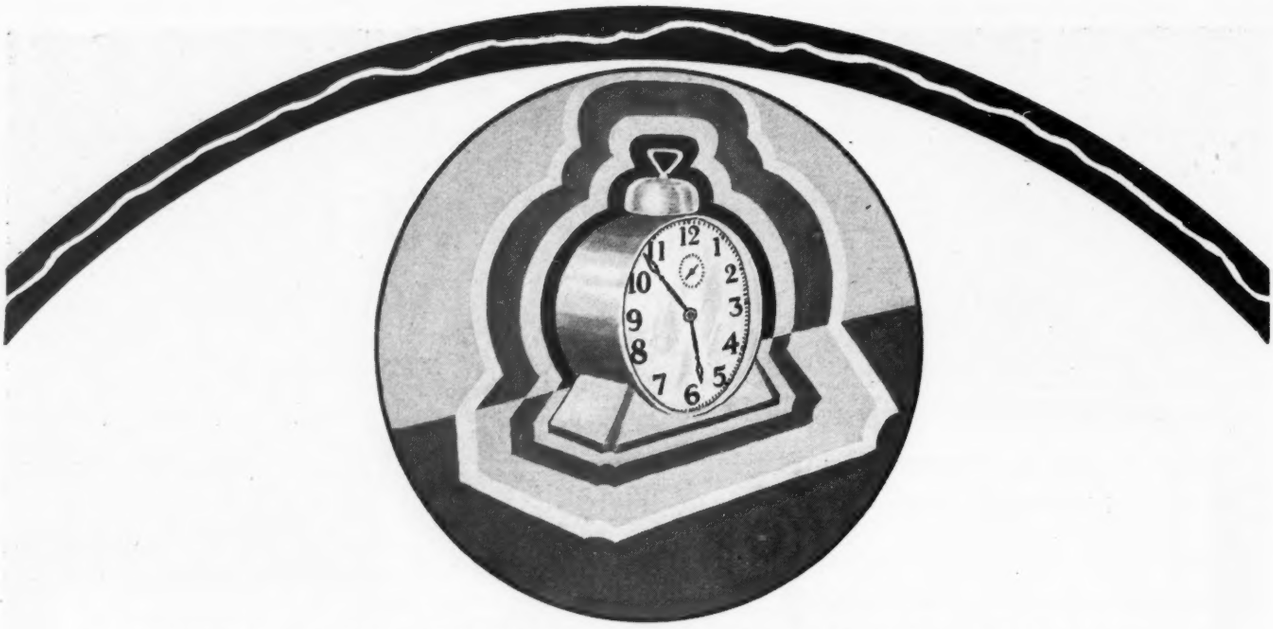
.....

REO Fulfills Every Need of Reliable Food Haulage

The Reo is the fastest and most easily driven of full-sized commercial vehicles having all-truck design and construction. ¶ Reo records of low-cost, long-life operation have never been disputed. ¶ Reo power and ruggedness, Reo safety and control, Reo riding comfort and saving of driver fatigue—are advantages operators seek and appreciate. ¶ Moreover, Reo-designed bodies are perfectly suited to food haulage needs and possess the advertising asset of fine appearance.

REO MOTOR CAR COMPANY, LANSING, MICHIGAN

SPEED WAGONS REO AND TRUCKS



ACCURATE COOKING CONTROL MEANS MUCH MORE THAN JUST AN *"alarm clock"*

USE *Tycos* CONTROL . . . . . .USE *Tycos* CONTROL

An alarm clock can wake you up but it can't toss you out of bed. Combine a silent alarm clock with a powerful "getting-up" mechanism and you have an idea of what *Tycos* Control does to a cooking or sterilizing job.

Tycos goes into operation the instant the temperature reaches the cooking point. It times the cooking period exactly. At the pre-arranged time, *Tycos shuts off the heat,* and can be arranged immediately to blow all steam from the vessel. This automatic system accomplishes three important things:

1st—uniform product
2nd—reduction of labor costs
3rd—elimination of spoiled batches.

Just how much *Tycos* Control will save you we can't tell until you send us your plant lay-out. But—the saving will be worth while. Let's get together.

The preliminary processes of blanching and exhausting are also important and should have proper temperature control.

Tycos

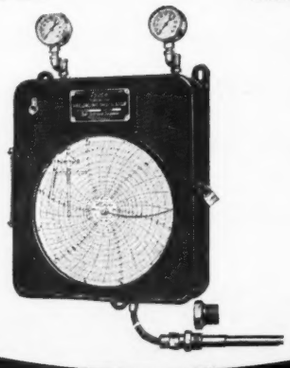
Taylor Instrument Companies

ROCHESTER, N. Y., U. S. A.

Taylor Instrument Companies of Canada, Ltd.
***Tycos* Building, Toronto, Canada**

Manufacturing Distributors in Great Britain:
Short & Mason Ltd., London

New York
Chicago
Boston
Philadelphia
Pittsburgh
Cleveland
Los Angeles
Indianapolis



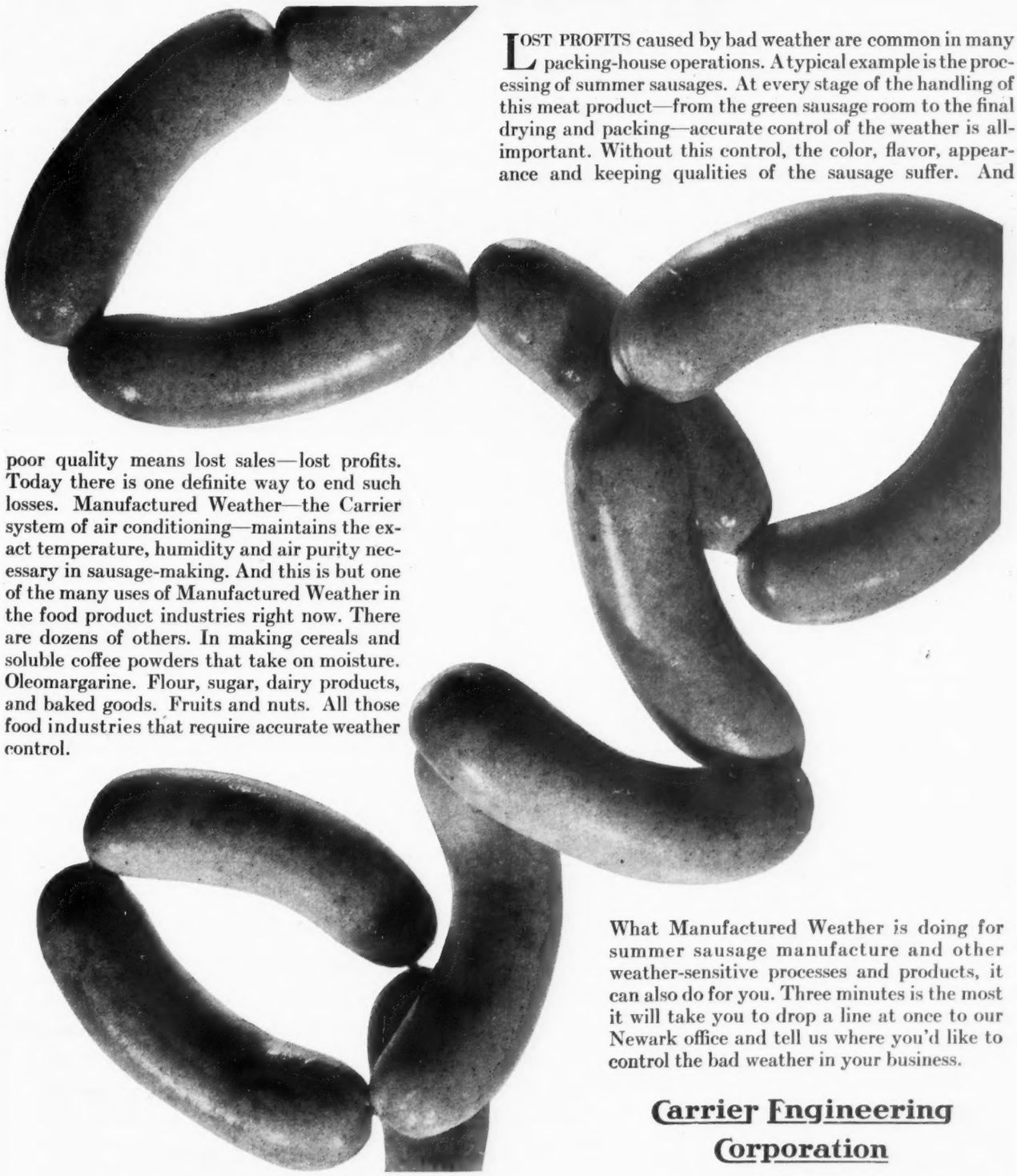
San Francisco
St. Louis
Cincinnati
Tulsa
Detroit
Atlanta
Minneapolis

IN PACKING MEAT PRODUCTS

(to quote one instance)

poor quality and lost sales can be charged directly to

BAD WEATHER!



LOST PROFITS caused by bad weather are common in many packing-house operations. A typical example is the processing of summer sausages. At every stage of the handling of this meat product—from the green sausage room to the final drying and packing—accurate control of the weather is all-important. Without this control, the color, flavor, appearance and keeping qualities of the sausage suffer. And poor quality means lost sales—lost profits. Today there is one definite way to end such losses. Manufactured Weather—the Carrier system of air conditioning—maintains the exact temperature, humidity and air purity necessary in sausage-making. And this is but one of the many uses of Manufactured Weather in the food product industries right now. There are dozens of others. In making cereals and soluble coffee powders that take on moisture. Oleomargarine. Flour, sugar, dairy products, and baked goods. Fruits and nuts. All those food industries that require accurate weather control.

What Manufactured Weather is doing for summer sausage manufacture and other weather-sensitive processes and products, it can also do for you. Three minutes is the most it will take you to drop a line at once to our Newark office and tell us where you'd like to control the bad weather in your business.

Carrier Engineering Corporation

A DIVISION OF CARRIER CORPORATION

Home offices: Newark, New Jersey. *Branch offices:* New York, Philadelphia, Boston, Chicago, Cleveland, Detroit, Washington, Dallas, Los Angeles. *For foreign office* addresses write Newark office.

MANUFACTURED WEATHER ENDS BAD WEATHER!

SEARCHLIGHT SECTION

EMPLOYMENT : BUSINESS : OPPORTUNITIES : EQUIPMENT—USED or SPECIAL

UNDISPLAYED—RATE PER WORD:

Positions Wanted, 5 cents a word, minimum $1.00 an insertion, payable in advance.

Positions Vacant and all other classifications 10 cents a word, minimum charge $2.00.

Proposals, 40 cents a line an insertion.

INFORMATION:

Box Numbers in care of our New York, Chicago or San Francisco offices count 10 words additional in undisplayed ads.

Discount of 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED—RATE PER INCH:

1 inch $5.00
2 to 3 inches..... 4.75 an inch
4 to 7 inches..... 4.50 an inch

Other spaces and contract rates on request. An advertising inch is measured vertically on one column, 3 columns—30 inches—to a page. Food Industries

COPY FOR NEW ADVERTISEMENTS RECEIVED UNTIL 3 P. M. ON THE 24TH FOR THE ISSUE OUT THE 2ND OF THE FOLLOWING MONTH

POSITIONS VACANT

A LEADING manufacturer of peanut butter located in the New York Metropolitan District, whose business is continually expanding, has an opening for another thoroughly experienced peanut roaster. Kindly state qualifications, experience, references and salary expected. P-72, Food Industries, 520 No. Michigan Ave., Chicago, Ill.

POSITIONS WANTED

CHEMIST, 10 years of intensive specialization on food products, chemical and biological research and consulting work. Chief of Alfred W. McCann Laboratories, 1923 to 1930. Qualified for production as well as research work. Available immediately. PW-73, Food Industries, Tenth Ave. at 36th St., New York.

NEW AND REBUILT

Buffalo Nut and Food Chopper, motor drive.
Day Clipper Egg Beaters, belt drive.
Double Pan Rack Trucks on casters.
Dough Mixers, single and double arm.
Leonard Date Pitter, motor drive.
Motors, D.C., 230 volt, 15 to 35 hp.
Steam Jacketed Copper Kettles, 10 gal. to 350 gal. capacity, with and without agitators; guaranteed steam pressure.

SAVAGE BROS. CO.
Since 1855—Candy Machinery—Coppersmiths
2638 Gladys Ave., Chicago, Ill.

Special Offerings

in PFAUDLER steam-jacketed TANKS and KETTLES.

also Wood TANKS and CASKS, all kinds. BOTTLERS' MACHINERY, WASHERS and RINSERS, FILLING and CAPPING Machines, PASTEURIZERS and LABELERS, FILTERS and FILTER PRESSES, every size and style, ROTARY STEAM DRYERS.

Write for our large illustrated CATALOG and Price Lists.

UNIVERSAL COMPANY
3625 Superior St., Detroit, Mich.

CAP DE LA MADELEINE, P. Q., CANADA

offers real inducements for new industries. Communicate with Romeo Morrissette, city engineer.

FOR SALE

Copper Steam Jacketed Kettles, Dough and Food Product Mixers, Bottle Washing Machines, Copper and Glass Lined Tanks, Filters, Filter Presses, Mills, etc.

We also purchase food product equipment. What have you to offer?

Loeb Equipment Co.
618-620 W. Lake St., Chicago, Ill.

UNION
Rebuilt Machinery
ATTRACTIVE PRICES · RELIABILITY · PROMPT DELIVERY
ALL MACHINES RELIABLY GUARANTEED FOR ONE YEAR

Complete Stock
Food Process Machinery

Copper Steam Jacketed Kettles with and without Agitators, capacities 25 to 1000 gallons, tilting and draw offs.
Dough and Food Products Mixers, single and double arm, one barrel to ten barrel capacity.
Vacuum Pans, 50 to 500 gal.
Filter Presses, Tanks, Grinding Mills, Bottle Filling and Pasteurizing Machines, Rotary Steam Dryers, Refrigerating Machines, all sizes.

Union Confectionery Machinery Co., Inc.
318 Lafayette St., New York, N. Y.

Write today to

This Section is the

Opportunity Index

of the food producing industries. You can reach the leading production and operating personnel, and others in this extensive group of industries, at a minimum cost, through an advertisement here.

SEARCHLIGHT DEPT.

Food Industries
Tenth Ave. at 36th St., New York

PROFESSIONAL SERVICES

FOOD RESEARCH LABORATORIES, INC.

Philip B. Hawk, Ph.D., Director

Investigations in Biochemistry and Nutrition

Food and Medicinal Products Developed, Tested and Standardized

114 East 32nd St. New York

Telephone Ashland 4-5671

FRANK C. GEPHART, Ph.D.

Research and Consulting Chemist

SPECIALIST IN THE CHEMISTRY OF FOOD AND ITS INDUSTRIAL APPLICATIONS SINCE 1906

Products developed, standardized, evaluated. Special problems investigated.

Office and Laboratories
23 East 31st St., New York

T. B. WAGNER

52 Vanderbilt Ave., New York, N. Y.

Consulting Chemical Practice
Chemical and Industrial Engineering

SPECIALIZED SERVICE TO FOOD and MILLING INDUSTRIES:

Developing new products and markets. Enhancing returns from by-products.

SCHWARZ LABORATORIES, INC.

An Organization Specializing in Food Chemistry

Analysts, Biologists, Consultants, Engineers

202 East 44th Street
New York, N. Y.

Member Ass'n of Consulting Chemists and Chemical Engineers

LLOYD A. HALL

Consulting Chemist

Specializing in the Food Industries

Food, Pharmaceutical, Bacteriological and General Industrial Process investigations. Advice in patent matters. Chemical analyses and research.

Consultation and expert testimony.

1415 West 37th Street, Chicago, Ill.

Pease Laboratories, Inc.

39-41 West 38th St., New York City

Complete Service to Food Packers
Food Preparation, Packing and Processing

Heat Penetration Determinations
Nutritional, Chemical and Bacteriological Research

PHILIP O. GRAVELLE

PHOTOMICROGRAPHS FOR INDUSTRY

Technical and Scientific Photographs made through the microscope, for the comparison of materials.

GRAVELLE PHOTOMICROGRAPHS

For Research, Development, Control and Advertising.

114 Prospect St., South Orange, N. J.
Telephone South Orange 2-2791

Skinner & Sherman

Incorporated

Chemists and Bacteriologists

Analyses, Research, and Consultation on Foodstuffs and Manufacturing Processes.

246 Stuart Street
Boston, Mass.

This Service Directory

is designed to give you the kind of services that will be of real value to your business.

Take advantage of it.

SW&C — A NATIONAL ORGANIZATION FOR CONSTRUCTIVE SERVICE

"Testing the Capacity of Management"

"Testing the Capacity of Management" is the title of a booklet which we have prepared for business men. Copies are available upon request.

Scovell, Wellington and Company

ACCOUNTANTS and AUDITORS
MANAGEMENT ENGINEERS

10 EAST 40TH STREET, NEW YORK

BOSTON CLEVELAND CHICAGO
PHILADELPHIA SPRINGFIELD
SYRACUSE KANSAS CITY SAN FRANCISCO

HENRY C. FULLER, B.S.

Research and Consulting Chemist

Specialist in the chemistry of food products, drugs, and medical preparations.

COMMERCIAL ANALYSES

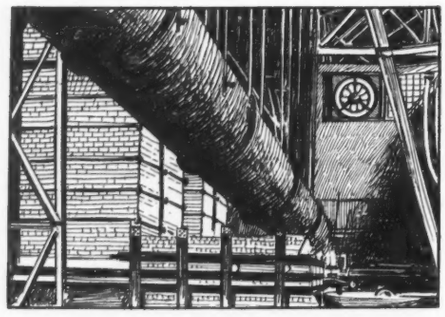
Labels and Advertising Matter Subject to State and Federal Laws.

OFFICE AND LABORATORIES
Columbia Medical Building
1835 Eye Street, N. W., Washington, D. C.

FOOD PLANTS—are generally dependent on the services of the professional consultant for the design of new plants, the perfecting or introducing of new processes, for research work, or for any chemical and scientific work that involves anything outside of ordinary plant routine.
CONSULT the men listed on this page and the opposite page of the "PROFESSIONAL SERVICE SECTION" of FOOD INDUSTRIES when such problems arise.

HINRICHS LABORATORIES
Carl G. Hinrichs, Ph.C., M.S.
Commercial Analyses of Food and Drug Products
Processes, Research, Expert Testimony
4110 Shenandoah Ave., St. Louis, Mo.

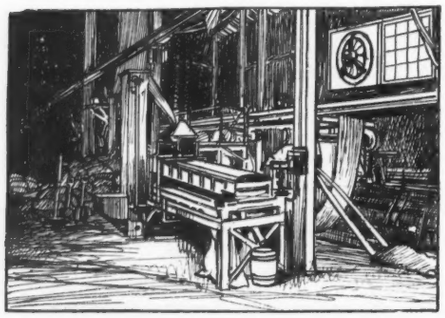
VENTILATION



A typical layout. Two 36-in. Breezo Fans remove the corrosive fumes from this room.

A battery of mixers, freed of all foul vapors by a single 36-in. Breezo Fan.

A sifting room, choked by clouds of dust before the "Breezo" Fans cleared the air.



. . . one of the first essentials in every food plant!

Acid fumes, poisonous vapors, and destructive dust play havoc with men and equipment—unless efficient ventilation removes the bad air.

"Buffalo" Breezo Fans *are* efficient, and yet a battery of them costs only a fraction of what many plants pay for *poor ventilation*. Breezo Fans are self-contained units, requiring no piping, no floor space, and no attention. You can install them easily, where the necessity is greatest.

Warehouses, evaporating rooms, sifting equipment, offices, power plants, and countless other rooms require and *use* Breezo Fans.

All Breezo Fans have totally enclosed motors, strong steel frames and the most efficient fan design. Breezo Ventilation does a thorough job and saves money for you. Investigate.

BUFFALO FORGE COMPANY

181 Mortimer St., BUFFALO, N. Y.

In Canada
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

ECONOMIC M.D.'s found 1930 a year with a temperature. The patient had weak knees, of that there is no doubt. The year showed a 32.6% decline in earnings for all industry. ● But . . . weak knees or no weak knees . . . the patient's stomach was sound. And his appetite hearty! Of 46 food manufacturing corporations whose earnings statements are available, 16 showed *greater* earnings in 1930 than 1929. Their net earnings for 1930 were *but* 7.98% less than for 1929. *Only 2* showed net losses! ● The pudding was good eating! Here is the proof . . .

The FOOD Business is GOOD . . . !

Corporation	Earnings 1930	1929
Canada Dry Ginger Ale, Inc.	1,187,448	1,277,138
Continental Baking Corp.	6,114,283	6,671,102
Hawaiian Pineapple Co.	2,531,346	3,166,308
National Biscuit Co.*	22,879,898	21,423,571
Standard Brands, Inc.	16,402,253	18,344,391
American Chicle Co.*	2,210,044	2,107,596
E. J. Brach & Sons	452,671	524,408
Coca Cola Co.*	13,515,535	12,758,276
Gurd & Co., Ltd.	196,837	207,645
Sweets Co. of America, Inc.	132,165	135,035
Geo. Watson, Ltd.	193,155	232,971
Hathaway Bakeries, Inc.*	545,619	416,844
Western Dairy Products Corp.	1,124,388	1,401,036
Kroger Grocery & Baking Co.	2,168,247	5,919,096
Swift Internacional*	6,549,287	5,560,089
Fanny Farmer Candy Shops	340,999	444,120
National Candy Co.	858,966	1,057,433
Cudahy Packing Co.*	2,930,318	2,512,850
Fajardo Sugar Co.	222,817	720,881
Adolph Gobel, Inc.*	139,382	131,298
Jewel Tea Co.*	1,705,293	1,691,302
Meade Johnson & Co.*	1,670,000	1,278,473
Wesson Oil & Snowdrift Co.*	3,208,420	2,547,137
Wilson & Co.*	2,542,656	2,304,592
Crosse & Blackwell	202,390	203,579
Quaker Oats Co.	6,003,860	8,735,205
American Ice Co.*	5,690,678	5,618,371
National Licorice Co.*	92,297	68,796
Loose-Wiles Biscuit Co.	2,465,597	2,732,095
Happiness Candy Stores	(Loss) 564,278	(Loss) 286,717
Cespedes Sugar Co.	79,045	164,629
Cream of Wheat Corp.	1,868,164	1,882,122
General Baking Corp.	5,165,981	7,239,221
Geo. A. Hormel & Co.	217,642	351,512
American Bakeries Co.*	581,595	553,866
Brennan Packing Co.	270,661	397,921
John Morrell & Co.	2,021,889	3,435,799
Purity Bakeries Corp.	4,130,871	5,652,284
Trunz Pork Stores, Inc.	224,937	315,591
White Rock Mineral Springs Co.*	1,315,394	1,229,872
Alaska Packers Assoc.	(Loss) 894,328	749,146
Cushman's Sons, Inc.*	1,166,838	992,963
Stahl-Meyer, Inc.	306,554	381,620
Ward Baking Corp.	2,053,546	3,124,413
Wm. Wrigley, Jr., Co.	11,404,092	11,454,926
Swift & Co.	12,491,189	13,076,815
Totals	147,310,969	159,907,621

*Increased earnings in 1930.

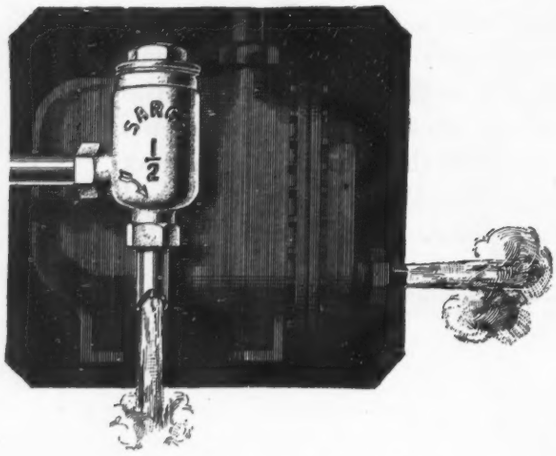
Figures are not given for companies whose 1930 statements are not truly comparable with 1929. (General Foods Corp., National Dairy Products Corp., etc.)

● This story is too good to keep. 16 food companies flashing greater earnings! Only 2 with net losses! A remarkable record for any year. For 1930 . . . an achievement!

W. R. Williamson

. . . PUBLISHING DIRECTOR

NO STEAM TRAP
IS LARGER THAN THE CAPACITY OF ITS DISCHARGE VALVE



DO not be misled by the bulk of cumbersome float or bucket traps. They cannot remove condensate faster than the water will pass thru their pin-hole orifices.

The Sarco needs no pool in which to swim a float, nor does it waste time by waiting to fill and empty a bucket. It discharges condensation continuously, as fast and as long as it forms.

That's why it is one-third the size and one-third the price of other traps. Sarco takes up no more space than a street ell.

Has only one moving part, the thermostatic element, which operates on a slight difference in temperature between water and steam. Sarco is self-adjusting for all pressures up to 100 lbs.

Over one million have been sold. A trial will convince you. USE THE COUPON.

SARCO COMPANY, INC.
183 MADISON AVE. « » NEW YORK, N. Y.
Branches in Principal Cities
Sarco Canada Limited
Federal Bldg., 85 Richmond St., W., Toronto, Ont.
Walker, Crosweller & Co., 20 Queen Elizabeth St., London, S. E. 1.

SARCO STEAM TRAP

SARCO CO., INC.
183 Madison Ave., New York, N. Y.
☐ Send a Sarco Steam Trap on 30 days' free trial.
Size..... for pressure..... lbs.
☐ Send Booklet No. AE-95
Firm .....
Street .....
City..... State .....

ALPHABETICAL INDEX
• TO ADVERTISERS •

This index is published as a convenience to the reader. Every care is taken to make it accurate, but *Food Industries* assumes no responsibility for errors or omissions.

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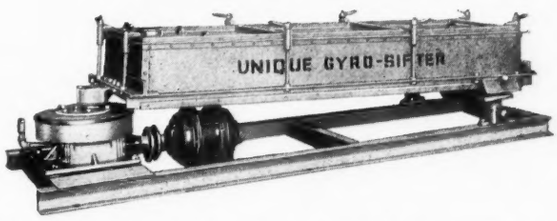
Write to the Equipment Information Bureau of FOOD INDUSTRIES *for "where-to-buy" data on any products on which you would like further details.*

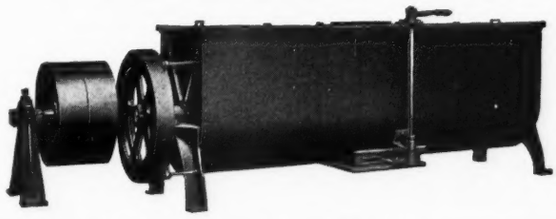
It's up to you!

THE GYRO-SIFTER



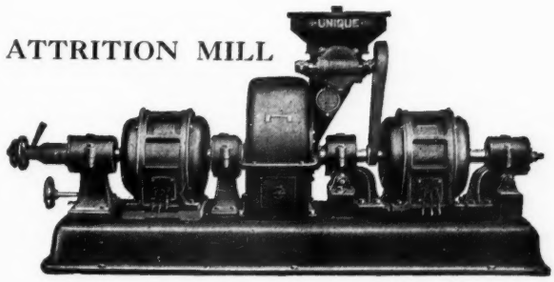
For all "siftable" materials. Ideal for sifting baking powder, dried eggs, milk powder, spices, salt, soda, etc. Built for making 1 to 5 separations. Many sizes.

MIXERS FOR EVERY PURPOSE



We build machines for mixing all types of dry powders, semi-solids, and liquids. Our line is the most extensive ever offered to the industries.

ATTRITION MILL



Grinds and pulverizes sugar, spices, all kinds of cereals, etc. More than 2000 in successful operation.

...modern food plants don't "just happen"

Behind every successful business is a wealth of planning, judgment and sifting of values. Whether you buy equipment of genuine value, or just passable is entirely up to you. Equipment buying is worth careful consideration.

We have spent years and dollars in developing a line of sifters, mixers and grinders *for your use*. They are built for these competitive times. They save money for you. They produce a more uniform and better product.

But—we want *you* to let *us* know what you need. In that way we can recommend the equipment best adapted to your particular problem.

Do it now!

ROBINSON MFG. CO.

71 Painter St., Muncy, Pa.

UNIQUE

ROBINSON SIFTERS, MIXERS *and related machines*

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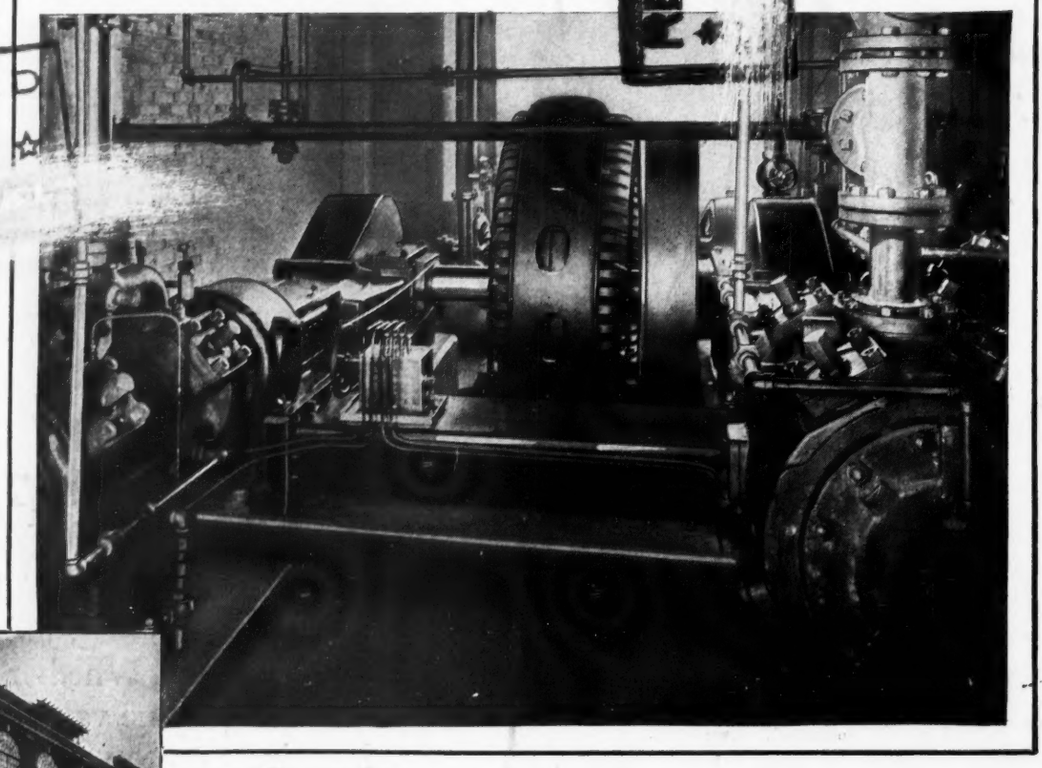
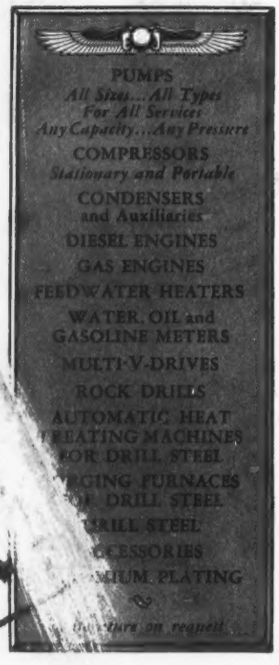


Makes "The Velvet Kind" more Profitable!

SINCE the spring of 1921, this Worthington Ammonia Compressor has played an important part in the production of "The Velvet Kind" ice cream for Knoxville, Tennessee, and vicinity.

The reliable and economical operation of this equipment has contributed its share to the successful record of the Chapin Sacks Corporation. So much so, in fact, that this manufacturer has installed six other Worthington Ammonia Compressors, of various sizes and types, in his other ice cream plants.

Whatever your requirements in ammonia compressors, you will find in the Worthington line a size and type that will do the job...and every Worthington machine is equipped with the famous long-wearing and trouble-proof Worthington Feather Valves.



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Worthington Feather Valve Ammonia Compressors are sold in the United States exclusively by The Carbondale Machine Company, Carbondale, Penna.

WORTHINGTON PUMP AND MACHINERY CORPORATION

Works: Harrison, N. J. Cincinnati, Ohio Buffalo, N.Y. Holyoke, Mass.

Executive Offices: 2 Park Avenue, New York, N.Y.

GENERAL OFFICES: HARRISON, N. J.

District Sales Offices and Representatives:

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BUFFALO	CLEVELAND	DETROIT	KANSAS CITY	NEW YORK	ST. LOUIS	SAN FRANCISCO	WASHINGTON

Branch Offices or Representatives in Principal Cities of all Foreign Countries

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WORTHINGTON